

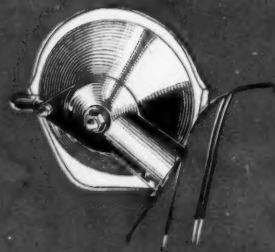
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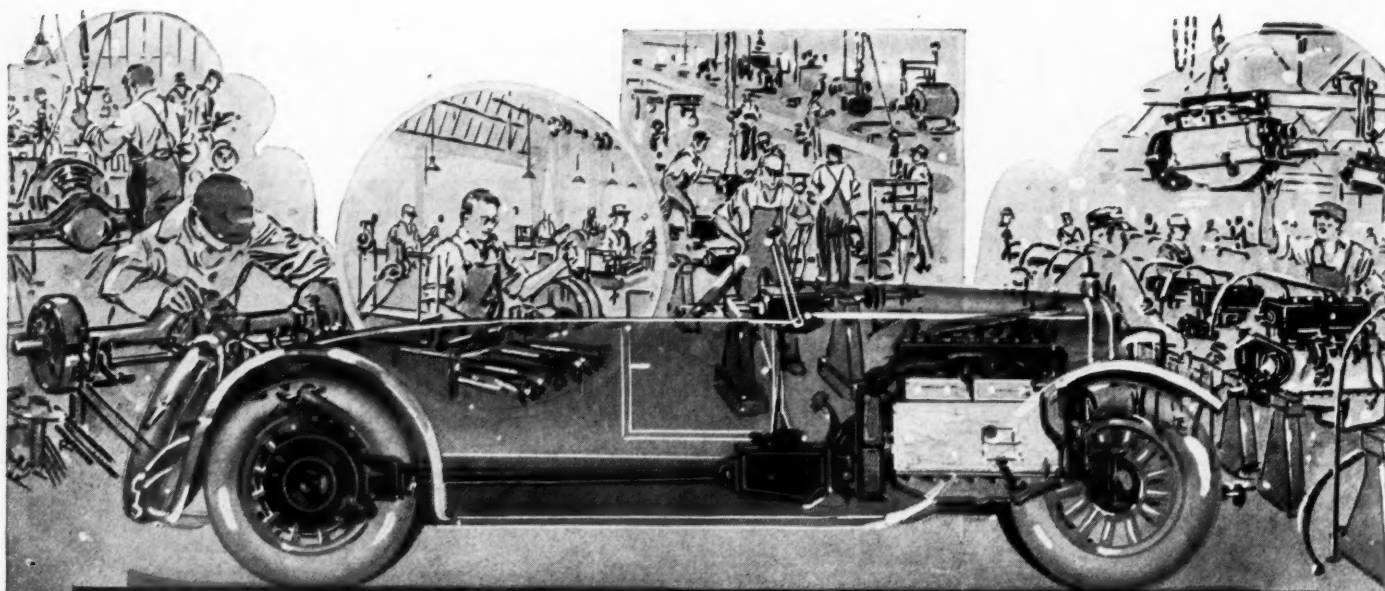
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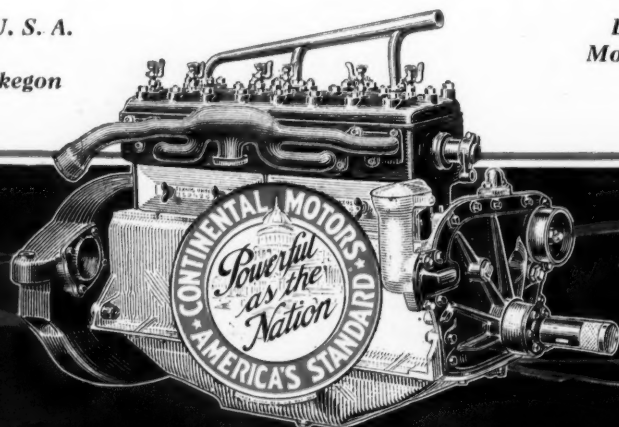
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AUTOMOTIVE INDUSTRIES

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No. 7

Truck Makers Perplexed by Baffling Fundamental Problems

Trading evil generally considered most serious question. Answer hard to find. Exceedingly difficult to locate right kind of dealers. How dealers can finance themselves another riddle of industry.

By James Dalton

NO one at all familiar with the subject will deny that highway transport is in its infancy. The recent development of the motor truck has brought many perplexing problems to which manufacturing executives are giving their earnest attention.

But inquiry will disclose that truck makers are giving deepest study and closest consideration to fundamentals which have been perplexing ever since the industry discarded its swaddling clothes.

These subjects have been discussed and debated until they have lost their freshness and have become thorns in the sides of those concerned with them. Something new always is more interesting than something old, but it does not always follow that it is more important.

Truck manufacturers are practically agreed that the three most important questions to-day, as they have been for years, are:

- (1) How to build up a distributive organization composed of real merchants and business men.
- (2) How to finance distributors and dealers.
- (3) How to make money on sales when trading has reached such proportions that almost every sale needs the peculiar talents of a David Harum to turn it into a profit.

Notwithstanding all the argument and debate on these problems they seem little nearer solution than they were when they first became important. Very

few of the many companies in the field have worked out plans which are in any sense satisfactory to them.

While getting the right kind of dealers who are able to finance themselves is in itself hard enough to bring creases in the brow of the greatest living optimist, most factory executives are tearing their hair trying to find the answer to the trading evil. If their dealers don't trade they don't make sales and if they do trade they don't make enough profit to increase their bank account appreciably.

The used car problem in the passenger car field is bad enough but in the truck branch of the industry it is worse. Remedies for the evil are easier to find in the sale of passenger cars but no panacea has been discovered. If anyone has found even a real sedative for the trading pains in the truck branch of the industry, he is keeping it a profound secret.

Some truck executives who are close students of their own problems and those of their neighbors, are coming to the conclusion that the real answer lies in educating truck operators to the profit to be derived from using their vehicles until they are worn out or ready for the junk pile.

If such an educational campaign is to meet with substantial success, service must become a fetish. Generally speaking, commercial vehicles require more service than passenger cars, and it is equally true that in most places service facilities are not as good.

A truck is a liability every day it is not in operation and for that reason the manufacturer who provides his users with the best service is the one likely to reap the largest harvest of sales.

The only way truck users can be induced to keep their old vehicles on the road is to give them prompt and efficient service at a reasonable price, thereby making it profitable to keep them in service rather than trade them in and get new ones. As it stands now it seems to be the fashion to run a truck for all it is worth one year and then trade it in the next for a comparatively small cash consideration.

AS long as this custom continues to prevail in its present proportions, few truck dealers will be able to show a satisfactory profit for themselves. When their earnings do not reach a reasonable figure they are discontented and when a man is discontented he never does his best work. When a factory branch does the trading it is worse for the factory.

Another complicating factor is the army truck reimported from England and France by the speculators who purchased them for a song after the war and who can afford to sell them over here for a fraction of their present list price. If a prospect can't get a liberal trading allowance he is quite prone to go out and buy one of these vehicles. The supply will be exhausted in the course of events, but it is putting a crimp in business at this time when the market is reviving. If Congress would impose a prohibitive reimport duty, as proposed in the Graham resolution, it would help a lot.

It would be easy enough to solve the trading evil if all manufacturers could make a gentlemen's agreement to adopt a definite policy in this respect, but such an agreement would be hailed as a combination of restraint of trade and even if it did not run counter to the anti-trust laws it would be impossible of realization with competition as keen as it is to-day and will be for years to come.

Inasmuch as a concerted policy is impossible at present it is up to each manufacturer and his own dealer organization to evolve the plan which comes nearest to meeting their particular needs. Many executives are getting gray-headed trying to hit upon this plan. Most of them would be well content to sell half as many trucks if they could eliminate trades.

Altogether it's a mighty hard nut to crack.

The most common practice seems to be to instruct dealers not to make trades on which they can't make money and not to look for volume of business. It's a philosophical dealer, however, who won't grumble when he refuses a trade because it will bring him only a small profit and then sees his neighbor across the street make the sale with the possibility of repeat orders in the future if he gives satisfactory service.

In the race for business, it must be confessed, some of the manufacturers themselves are not without reproach. For example, a prospect goes to a branch of a certain company and asks how much of an allowance will be given on his old truck. He gets an offer and then goes to a couple of other branches. He listens to

their proposals and if they are not as good as that of the first company he tells them of the original offer. They say they will take it up with the company and see if they can't do something special for him. Usually, they meet the offer of the first company. Then the shopper goes back to No. 1 and says:

"You said you were making me a mighty liberal offer when you gave me that price for the old wagon, but you weren't. I know of a couple of other places where I can do better. Do you want to come through with something worth while?"

Then, rather than lose the sale, the first company interviewed will raise its bid and make the sale.

This kind of competition isn't good business, it doesn't tend to stabilize the market and it tends to give dealers hydrophobia.

Even if the contention that trucks should be operated until they are worn out is accepted without question, it brings in complications. Trucks frequently don't give as good service as they should because they are operated by careless or incompetent drivers who abuse them. Drivers of this type, and unfortunately there are many of them, have no regard for the factor of safety, either for the vehicle or the pedestrian. They seem to look

upon traffic regulations as so many people do the Volstead law—made only to be broken. The vehicles they drive are subjected to overloading and other abuses which wear them out before their time and send them to the repair shop when, with decent treatment, no repairs would be necessary.

The subject of trades is closely related to that of dealers. The better merchant and business man a dealer is, the more likely is he to turn down a prospect unless he can show a profit on the transaction.

The chances are that if

every truck manufacturer had exactly the right kind of sales organization the retail end of the truck business soon would settle down on a solid foundation just as the sewing machine, piano and talking machine businesses did after long periods of travail.

As a matter of fact the president of at least one important truck company is wondering if a good many of the evils of the replacement business cannot be solved by adaptation of the methods employed successfully in the sale of sewing machines and pianos. That angle of the situation might be worthy of serious study.

IT'S a hard job to get the right type of business man to handle trucks. He is not attracted by the comparatively small profits. While in the aggregate there are many men of this type in the truck business, there are many more who have little knowledge of business or business methods. They don't know how to read a balance sheet to say nothing of preparing one. Most of them have too heavy an overhead.

There has been a sadly large mortality among truck dealers since the depression began in 1920. It has been especially heavy in the agricultural districts and the smaller urban centers. As a consequence, just when the farmers are coming back into the market, most truck makers find themselves woefully weak in their representation in these sections. They can get by in

TRUCK manufacturers are giving most earnest thought at this time to three questions almost as old as the industry. They are:

How to get the right kind of dealers.

How to finance dealers.

How to cure some of the ills of trading.

This article does not answer these perplexing questions but merely outlines some of the difficulties which confront manufacturers of commercial vehicles and their distributing organizations.

the larger cities, but they have few missionaries to carry the gospel of the commercial vehicle to the farmer.

Largely because of their inability to get satisfactory dealers, most truck companies are turning to a greater or less extent to factory branches. This move, generally speaking, is largely experimental. If it is successful it undoubtedly will expand. The biggest joker in this system is that branches must trade, too, if they are to get their share of the business. As a matter of fact one of the greatest grievances of the truck dealer in the town where rival companies have branches but his company has none, is that the branches offer such liberal allowances in trades that he cannot possibly compete with them.

Dealer financing is the third acute problem in the truck industry. With loose money piling up in bank vaults and interest rates constantly trending towards lower levels, it might seem a comparatively easy matter for a reputable dealer to go to his bank and finance himself for a reasonable amount. But it isn't.

Banks in the aggregate have lost a lot of money in the last two years on trucks. It must be confessed that trucks weren't sold on a scientific basis, at least before the slump came in 1920, and a lot of them were purchased on time by people who thought they could make them pay for themselves. They might have been successful in this commendable effort if the bottom hadn't dropped out of business. It did drop out, however, and when there was no freight to transport there was no money with which to meet the notes and the banks were left with the trucks on their hands.

They weren't in a position to hang onto these commercial vehicles and wait until the market improved, so they sold them for whatever cash they would bring and pocketed their losses. With these experiences back of them, it is not unnatural that banks should look askance upon the financing of truck sales. They are not likely to analyze the economic situation to determine that the prospects for successful commercial vehicle operation are better now than they have been in two years. They don't want truck paper and they won't take it, in most places. This makes it exceedingly difficult for the dealer to finance himself.

AUTOMOBILE finance companies are not keen on truck business either. Their experience has been much the same as that of the banks. Credit men for these concerns spend a good share of their time cussing truck companies because of the calibre of their dealers as business men. They are more rigid in their requirements than they ever were before.

If the truck dealer can't finance himself either at his bank or through a finance company he's in a bad way. His company isn't going to ship him stocks unless he can pay for them.

What's the answer?

That's what's puzzling the truck makers. There's a fortune in it for the man who can solve the riddle.

THE companies which are in a strong enough cash position to undertake the work are themselves helping their dealers. One of them has evolved a plan under which the trucks on dealers' floors are financed through the banks. The dealer borrows from the bank at the regular interest rate and the loan is guaranteed by the company. When a truck is sold the transaction is automatically closed. That would be a perfectly satisfactory system if all trucks were sold for cash, but they aren't, by any means. Unless the purchaser can get credit from a bank or a finance company it's up to the dealer to finance the sale. If he does he takes a chance unless he's mighty sure of the character and ability of his prospect.

Many manufacturers believe that the day of the heavy duty truck, except for use in large urban centers, is rapidly passing. It is logical to assume that it will be easier to finance individual sales of less expensive vehicles but it may bring up a new crop of problems not yet foreseen.

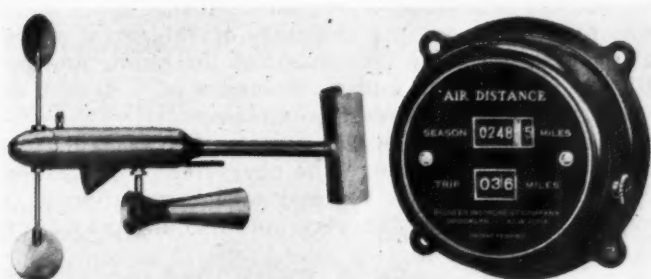
Makers who believe that the trend is away from heavy trucks base their contention on the fact that nearly 75 per cent of all the commercial vehicles now in use are of less than 2 tons capacity and nearly 70 per cent less than 1½ tons capacity. The demand for lighter vehicles is increasing steadily except in the larger cities. It is felt that the various states will not be willing to build roads which will carry heavy traffic when comparatively few trucks of more than 2 tons capacity are in operation. In this connection state regulations in regard to overloading are highly important. There are many truck makers who believe there will be important developments in the trailer field in the next few years.

Most manufacturers in the truck field, notwithstanding all the difficult problems with which they are confronted, are convinced that business will be better in the year which began July 1 than in the twelve months which ended at that time. They feel that sales for the next six months will depend largely upon the farm market but the outlook for large sales in the agricultural districts now is bright. They are certain that 1923 will be better than 1922 both for themselves and their dealers.

An Air Distance Recorder

AN instrument intended to perform in an airplane the function performed in passenger cars and trucks by an odometer showing the distance traveled, is being manufactured by the Pioneer Instrument Co. under the name air distance recorder. The instrument is similar to an odometer in appearance.

The instrument is actuated by a device called a transmitter which has a propeller rotated by passage of the plane through the air. Once a mile this propeller actuates a valve which admits air to a vacuum space exhausted by a small venturi tube. In so doing one mile is added to the record shown on the dial of the indicator, which is joined to the transmitter by a 3/16 in. metal tube.



Details of Pioneer Air Distance Recorder

Proper Highway Finance Essential to Automotive Progress

The building of highways should be put upon a sound economic basis. Adequate maintenance funds must be provided. Co-ordination of various highways needed. Deferred serial bond issue best form yet devised for financing where bonds are necessary.

By A. J. Brosseau*

THE past ten years have witnessed an evolution in highway transport far beyond the conception of even those men who pioneered its cause. From a total production of some 500,000 cars in all of the period up to and including 1911, the use of the motor vehicle has been extended to 10,500,000 machines in the opening months of 1922, while the production and sale continues to-day without abatement.

As President Harding said in his first address to Congress: "The motor car has become an indispensable instrument in our political, social and industrial life" and the evidence is to be found in the rapidly multiplying uses to which the vehicle is being put.

With this modern unit of transport has come an insistent demand for modern highways. Roads designed for slow moving traffic have been found inadequate. The increasing use of the motor truck has brought with it new requirements.

Highway engineers are faced with the dual task of providing heavier types of road bed and of finding the means to finance the huge construction program ahead.

To obtain a full perception of the relation existing between rolling stock and road bed, it is only necessary to say that while the former has increased some 2000 per cent in a decade, the effective increase in the latter has been only 250 per cent.

It is obvious, then, that just as the last decade has seen an intensive development of the machine, so the next decade must see an intensive development of the highway, if the two are to be linked together in an efficient and economical system of highway transport.

Sociological, economic and social surveys have demonstrated the imperative need of this system. No preaching is necessary. No alternative thinkable.

THE task then is to search out underlying facts and to proceed to a reasoned program of finance which will at once properly distribute the costs of this great undertaking, safeguard the investment of the public and permit the construction and maintenance of a system designed to give the broadest possible service.

Before a definite financial program can be laid down, it is necessary to examine the character of the project to be financed. This is not easy of determination in the present case because the very youth of highway trans-

port and the lack of definite knowledge concerning its influence has obscured us in a mist of half-truths, fallacies and nebulous theories which must be subjected to the rays of understanding.

Thus we have heard it said the modern traffic has torn modern roads to pieces long before the expiration of the bonds issued to finance them. Let us then examine first the very nature of the highway.

First we find that 40 per cent of the cost of modern construction is devoted to location, gradients, drainage, bridges and other features which will last for literally hundreds of years. Second, we find that the remaining 60 per cent is devoted to wearing surface, and that even in the case of its deterioration that all except a fair interest charge can be and is being salvaged in the construction of new surfaces by the simple expedient of using the old material as a base for the new.

There are, however, definite limitations to these general statements.

NONE of the features mentioned as permanent would be so if the highway were constructed without regard for the economic or other needs of the community which it is to serve, so a first principle in construction must be reasoned traffic or economic surveys entirely apart from political or other wasteful considerations.

Again, if these permanent features are improperly constructed, they lose their value, hence adequate engineering control must be taken as a positive and definite requirement.

Pressing this one step further, highways do not attain their maximum of use unless they are constructed in co-ordination with other highways. The need for centralized engineering authority is at once evident.

Another series of limitations will be found in the provisions for safeguarding the interest of the investor—in this case the public.

No business man would ever invest his money in a building if he did not see his way clear to properly providing for the up-keep of that building. No highway should ever be constructed unless adequate funds are provided for its maintenance.

Many of the fallacies which have crept into our accepted theories have been due, not to the intensive use of the road, but to lack of proper maintenance.

It is sheer waste and even a misuse of the public funds to attempt to build a modern highway without assuring its upkeep.

*President, Mack Bros. Motor Car Co.; Highways Committee N. A. C. C.

With these definitions and limitations in mind, it is necessary then to see who is to benefit.

It will be generally admitted to-day that the construction and maintenance of a system of highways is of service not only to those of the present generation but to those who are to come after us.

Theoretically we might press forward this limit indefinitely. Remembering that the native genius of the American has already set aside many of the traditions of the past, it is, perhaps, well to limit this discussion for practical purposes to the next fifty years.

If those who are to follow will benefit by this system of highways, should it be given to them free of charge or should they be asked to pay a fair proportion of the capital charge?

The answer is dependent upon the life of the system. If these highways are to be constructed by local authorities without due regard for economic or engineering facilities, then the community which is responsible should bear the full charge.

Similarly, if properly designed and constructed highways are not adequately maintained, then the community responsible should bear the full charge.

But, if these limitations are met, if there is responsible, centralized, engineering control coupled with adequate maintenance funds, then as a matter of equity the cost should be amortized over a period of years, each generation assuming the responsibility of handing all its sector of the road to the next in as good or in better condition than it was when received.

Return to our analysis of the character of the highway for evidence.

Review the analogy of the business man who spreads his capital costs over a term of years, paying current operating costs out of current revenue.

With the nature of the project before us, some conception as to the life of the service it can render and an understanding of the limitations, the problem then is to select that form of finance which will most cheaply and most adequately care for the project and fortunately, here we enter upon carefully charted seas with the trained pilots of the banking world to steer.

At the outset the limitations made will restrict the discussion in a general sense to state highway bond issues as generally speaking it is only the states which have both centralized engineering control and tax rating powers ample to control maintenance requirements.

Some states may have progressed so far with their programs of highway construction that no present ne-

cessity will be felt for highway bond issues and there the determination is one which rests between the state highway officials and those men charged with the responsibility of raising revenues.

Where there is need for highway bond issues, however, and this condition is the more general one to-day in the present state of undevelopment, the first consideration is the particular types of highway bond issues which will best serve.

Thus far the most scientific form is the deferred serial bond issue on which payments of principal do not begin until after a period of say five years following construction. In this type of bond, payments begin at the peak and are scaled down in successive years as the principal is decreased.

The deferment of principal charges gives opportunity for completion of the project and allows the increased earning capacity of the highway to become evident.

The serial bond spreads the charge over as many years as may be desirable, absolutely protects the investor through required annual payments, offers an attractive issue to the man who desires long term investments and minimizes dangers involved in administration of a public debt.

With the capital outlay thus cared for, the state highway official can then definitely budget his requirements for construction and maintenance, year by year, and can point his organization definitely a fixed course.

The question of maintenance is no longer an indefinite subject, but is clearly defined since it must in-

clude all current operating expenses up to and including reconstruction unless an inferior is replaced by a superior type of pavement, or unless a highway is widened or extended, all of which are as definitely capital charges subject to amortization as floor replacement to care for heavier machinery, addition of new stories or extensions of a factory in business life.

Finally, the effect of such issues will be to definitely allocate highway costs as between this generation and those to come; to distribute the burden equitably; and in that distribution to expedite the completion of a system of highways.

The increased earning capacity at once visible through lowered costs of transport, added valuations for urban and agricultural property and the general uplifting of our standards of living, is all of the justification necessary for adoption of standardized methods of finance at the earliest possible moment.

THE importance of proper highway development is vital to the growth of the automotive industry. This is being rapidly recognized by automotive executives. The word "vital" is used with the full significance of its dictionary definitions, one of which is "being that on which life depends."

* * *

This article has been written by one of the men in the automotive industry who is keenly aware of the definite relation between highway financing and future car and truck sales. He has studied the entire problem very carefully. His views should be read by every executive in the industry.

British Truck Weight Legal Limits Raised

AN amending order to the Heavy Motor Car Regulations has been issued in England by the Ministry of Transport, covering tractor-trailer combinations, the general effect of which is: (1) to increase the permitted axle-weight of a trailer from four tons to six and one-half tons; (2) to prescribe a maximum limit of 22 tons for the sum of all the axle-weights of car and trailer; and

(3) to permit a maximum speed of 12 m.p.h. for any heavy motor car fitted with resilient tires when not drawing a trailer. The special tractor and trailer combinations will be permitted a maximum speed of 12 m.p.h. provided all the wheels are fitted with soft tires, the total length does not exceed 33 ft., and the conditions as regards weight are complied with.

Neglect of Water Flow Cuts Cooling Efficiency

Heat dissipation in the cooling system of an engine depends upon many factors. Among those here considered are the rate of water flow at various points, and items such as pump design, arrangement of radiator, etc. Forced circulating systems are said to be more efficient, lighter and cheaper than the thermo-syphon type.

By A. Ludlow Clayden

PRIOR to 1915 comparatively little attention had been given to quantitative examination of engine cooling.

Even to-day, while a good deal more is known, there still remains much to be learned. The very elements of the problem involving rates of transfer of heat from one substance to another have been studied only in a fragmentary way; in fact, as recently as last April the National Research Council set in motion machinery which it is hoped will collect existing information, arrange for the making of new tests, etc. In about ten years it is hoped that the fundamental facts concerning transfer of heat will be known.

Engine cooling as applied to automobile engines has always been haphazard. The needs of aviation forced attention to the grosser absurdities of current practice, and reaction from knowledge gained in the air is likely to have some effect on other automotive apparatus, but recent discussions on such subjects as air and water systems have shown that general appreciation of the fundamentals is lacking to a remarkable degree.

There are several stages in cylinder cooling. First the transfer from the actual hot gas to the oil or carbonized film within the cylinder. Here the desire is to transfer as little heat as possible. Second is transfer from the oil film to the metal of which the cylinder is composed. Then comes conduction through the metal, and then transfer from the metal to the cooling air. This last stage can either be direct, or we may have transfer to water, from water to metal in the radiator, and finally from radiator metal to air. In all these stages the desire is to obtain the most rapid transfer possible, with exception of the first stage only. No exact laboratory data is in existence regarding any of the stages of transfer except conduction through metal, although there is a good

deal of data available on overall rates of transference.

All heat rejected to cooling water is, of course, waste heat. If it be assumed that, for a given engine, a given amount of heat must be wasted, then the desire should be to dispose of that heat with a minimum additional expenditure of energy. In the case of a motor boat engine the amount of energy absorbed by operation of the cool-

ing system is the power necessary to drive a circulating pump, which, owing to the unlimited supply of water available, need only consume very little energy in proportion to the size of the engine. In all aircraft and land vehicles energy is required to induce the passage of an adequate supply of air through the system, and energy is needed to carry around the weight of the parts used for cooling. The most efficient cooling system is that which calls for minimum power to operate it.

In aircraft a fairly exact comparison in respect to efficiency is possible, because the effect of the weight and of the parasite resistance can be calculated within fairly fine limits. On the

road comparisons are not so easy, and first cost becomes an item of importance.

It would seem that, given the general characteristics of any engine, it ought then to be possible to state the amount of heat which would have to be dissipated through the water system. Actually the number of variables is so great that little more than a rough approximation can be arrived at without actual test. It is undoubted that the amount of heat rejected to the cooling water is proportional to the mean gas temperature in the cylinder and to the developed area of the combustion chamber. Experience shows that a Knight engine requires less radiation via the water than almost any other type, and it has, of course, the most compact combustion chamber. It is a

THIS is the first of a short series of articles dealing with the subject of cooling systems for automotive vehicles.

Mr. Clayden has had considerable experience in the design and layout of radiators, pumps, other related components and in solving practical problems which arise in connection with their use. In this article he deals primarily with water circulation and the factors which affect it.

In later articles he will cover various problems relating to air flow and will deal specifically with recent developments in steam or vapor cooling systems and to some extent with the subject of air cooling.

Written discussion of any or all these articles for publication in the Forum is invited.

fact of common knowledge that a T-head engine requires a great deal of "cooling." For this reason it is not possible to take the more precise data obtained from close study of aviation engines and to apply it in a general way to other types of gasoline engine, because nearly all aviation engines have combustion chambers of the most compact sort. Also aviation engines normally are desired to operate with lower mean cylinder temperatures than motor car engines, probably owing to the fact that the cooling of the piston by transfer through the cylinder is important in engines of high duty and large bore, while it is of relatively little importance in engines of the road vehicle type.

F. W. Lanchester in 1916 gave some more exact information than had hitherto been published,* but later data has shown the necessity for modifying many of his conclusions. An important factor of which practically nothing was known at that time is the turbulence of flow of both the cooling liquid and of the air. Consequently radiators of considerably smaller dimensions than those which Lanchester considered necessary can now be used for both aircraft and automobiles.

HOWEVER, in so far as heat rejection from the cylinder is concerned, Lanchester's work has been well upheld, although the rule he gives is admittedly quite general and liable to considerable variation due to details of design. He states:

"The mechanical equivalent of the heat lost to the cylinder and combustion space in an internal combustion engine of ordinary type, may be expressed as equal to one-tenth of the mechanical equivalent of the heat value of the fuel consumed, plus one horsepower for every inch of cylinder diameter."

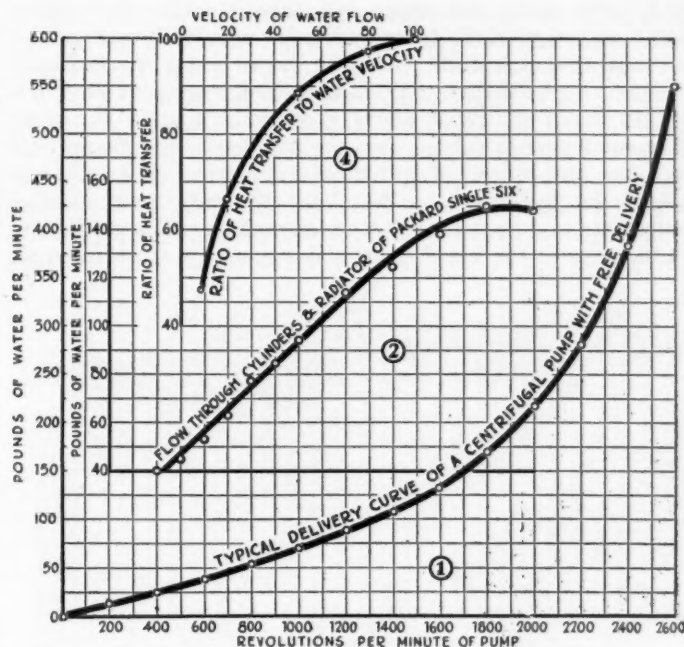
In most cases this will be found to be approximately equivalent to the brake horsepower of the engine. Lanchester also states his rule in another way which is a little less accurate, but also very near to the truth in a great many cases. His statement is in effect that the loss of heat to the cooling water in normal engines is 13 horsepower per developed square foot of area of all cylinder walls and combustion chamber walls added together.

Since in the design of cooling systems for road vehicles it is usually desired to be well on the safe side, the author considers that far the best rule to apply in the absence of more exact data is that the heat which the radiator must be capable of transferring to the air available will be equivalent to the brake horsepower at the required speed.

The last qualification "at the required speed" leads to mention of another highly variable compromise factor. It is practically impossible to provide an automobile with a cooling system which will enable the engine to be run at full power on low gear indefinitely, nor is it necessary. An engine should have equipment which will keep it cool at full power and full speed on *high* gear indefinitely. Such equipment will be adequate for nearly all conditions of actual operation.

One of the hardest conditions for the conventional cooling system is continued operation at or near the speed of maximum torque, as, for instance, pulling up a long stiff grade, wide open on high gear doing, say, 20 miles an hour. This condition is usually provided for by a reserve excess of water, a sort of water flywheel. Suppose, for instance, that it is desired to operate the engine at a mean water temperature of 160 deg. Fahr., which is about normal for an automobile. At such a mean temperature the maximum will usually be about 170 deg. Fahr., and

*The Cylinder Cooling of Internal Combustion Engines, Proceedings the Institution of Automobile Engineers 1915-1916.



The reduction of heat transfer to water flow in an automobile cooling system

the minimum, of course, 150 deg. Fahr. Boiling will not begin until the mean water temperature has been raised nearly 40 deg., or until the outlet temperature is 210 deg. Fahr. Now, suppose the cooling system at 20 miles an hour is capable of transferring to the air the equivalent of 20 horsepower and the engine is developing 30; the excess of 10 hp. will go to heating the water, and the time taken to raise it to boiling depends upon the total amount in circulation. With 50 lb. of water in the system and heat being added at the rate of 10 hp., it will require between four and five minutes' operation to heat all the water 40 deg., and this is a longer time than it takes to climb most grades of the character considered.

The point to be remembered is that any road vehicle which normally keeps the water at the desired temperature but boils on exceptional hills, is usually best cared for by increasing the amount of water rather than by increasing the size of the radiator. Nothing of the sort can be done in the case of aircraft, which must be provided with radiator capacity adequate for indefinite full power output at climbing speed.

While there is considerable variation in the amount of heat rejected to the cooling water in various forms of engine, there is a far larger variation in the efficiency of transfer of different types of radiator. The radiator is fed with air at atmospheric temperature, and the amount of heat which it can transfer to that air depends upon the velocity of the air flow and the transfer coefficient, which last will be characteristic of the particular type of radiator.

THERE is, however, a stage preliminary to this which is usually neglected, but which is actually quite important, and this is the rate of transfer of heat from the water in the radiator to the metal thereof. The author is unaware of any precise data regarding this subject, but it has been observed that for radiators of different types there are different velocities of water flow at which the heat transfer is maximum. It is probable that there is a critical velocity depending upon the shape and dimensions of the water passages at which smooth flow changes into turbulent flow; also that the most rapid transfer exists at a degree of turbulence just below the velocity at which cavitation begins.

A very rough and ready rule indeed which the author has found applicable to radiators of widely differing type is that the maximum transfer from water to radiator occurs at about the maximum velocity obtainable from a 3-in. head of water above a radiator core 1 ft. high. Obviously such a rule is only the roughest sort of approximation, but since, in automobile practice, a 3-in. head above the radiator core is about the maximum obtainable, the rule emphasizes the advantage of a wide low radiator over the high, narrow designs now most favored.

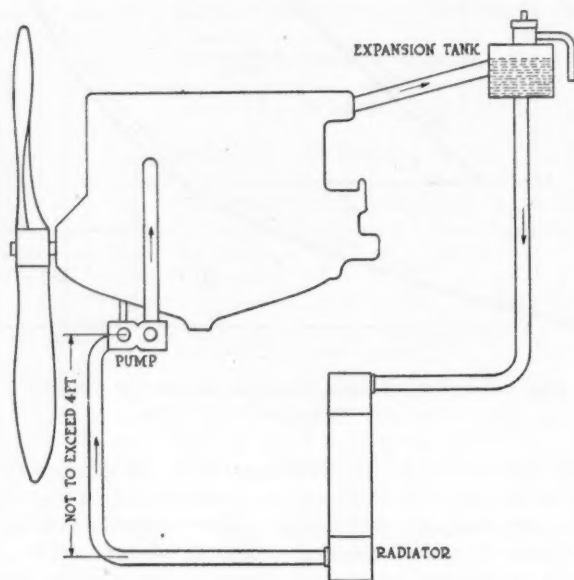


Diagram of airplane cooling system with radiator below engine and expansion tank above to insure rapid flow of water

The rule can be reversed to read that, with most designs of radiator, the head of water should be adequate to provide a rate of flow equivalent to that given by a 3-in. head over a 1-ft. height of core. It should be added that the falling off in rate of transfer as the velocity of flow falls is not very pronounced until about 60 per cent of the maximum, after which it decreases very rapidly indeed. In most of the writer's tests the curve has taken a parabolic form.

It is interesting to observe that this fact has been given considerable attention by airplane constructors, and it is now recognized that one of the advantages of placing the radiators low down on the side of the fuselage is so that the engine being perhaps several feet above them, the rate of flow will be rapid. On the other hand, there is hardly a road vehicle in existence in which the water flow is much more than half what it should be for maximum transfer.

THE idea of placing the radiator below the engine is so novel from the automobile standpoint that perhaps a little more explanation is desirable. Imagine the engine fed with water from a pump and neglect for the moment the source of supply of the pump. The cylinder outlet is at the top, as usual, and discharges into a small header or "expansion tank" open to the atmosphere. So far we have paralleled automobile practice, and we continue to do so when we say that the next stage is for the water to flow by gravity from the tank, down through the radiator core, except that in this case there is a drop of several feet before the core is reached, which means that the flow through the core will be much more rapid than otherwise.

Assume for a moment that the bottom tank of the radiator is also open to the air, then, to keep the system bal-

anced, the pump must draw off water from this tank as fast as it reaches there and return it to the engine. This is exactly the ideal condition. Of course, in actual fact the bottom tank is closed, but efforts are made to proportion the system on the basis described.

For reasons which will appear later on it is desirable that the static pressure at no point within the system should be less than 26 in. of mercury. Four inches of mercury is practically the equivalent of 4 ft. of water in terms of atmospheric pressure, hence we reach the theoretical limit when the bottom tank of the radiator is 4 ft. below the pump, and this is considerably more than most designs of aircraft can accommodate.

Tests recently made by the U. S. Navy shed some interesting light on this question of water turbulence. These were made on a variety of radiators, principally a type composed of a honeycomb of round tubes with expanded ends giving a tortuous water passage, and with the Lamblin type, which has water passages of very narrow rectangular section. It was found that, at the speed of flow at which the honeycomb type showed its maximum efficiency, the rate of transfer from water to air was about the same for both types, per unit of developed area, but the efficiency of the Lamblin type increased well above this figure when the water velocities were made still much higher. Naturally it would require higher speed to produce turbulence of flow through a smooth rectangular pipe, then through the interstices of a honeycomb, but the speed of maximum efficiency for the latter was above that commonly employed.

AN effect of turbulence in the water which has only been studied very slightly is probably to be found at the other end; that is in the jacket where the water picks up heat from the cylinders. Transfer at this point ought to be capable of increase in speed if means could be devised for ensuring turbulent water flow, but to secure the desired effect it would probably be necessary to use water spaces impractically thin and to feed and extract water at scores of points all over the jacket. It has been fairly well shown that no perceptible difference in rate of transfer out of the cylinders results from cutting down the water space from $\frac{1}{2}$ to $\frac{1}{4}$ in. while maintaining the same volume of water flow; which means doubling the flow velocity.

High velocity of water flow has another advantage although a lesser one than the gain in rate of transfer due to turbulence. This is because the rate of transfer from the radiator to the air is in direct proportion to the difference in temperature. Suppose the amount of heat being dissipated is 20 hp., roughly 850 B.t.u. per minute, and that water is circulating at the rate of 50 pounds a minute. Then the drop in temperature of the water must be 17 deg. Fahr. Suppose the atmospheric temperature is 75 deg. Fahr. and the outlet water 175 deg. Fahr., then the mean temperature of the radiator will be 166½ deg. Fahr. and the mean difference 91½ deg. Now suppose the speed of flow doubled. Then the drop will be only 8½ deg., the mean radiator temperature 170¾ deg. and the mean difference 94¾ deg. Supposing the radiator correctly proportioned for the 50 pound flow, then an increase in flow would enable the amount of core to be reduced approximately 4 per cent. In actual practice this would mean from 1½ to 2 lb., or perhaps fifty cents in cost.

Of course this does not sound a great deal, but the example chosen would represent a fairly good sample of automobile system. Often the drop is much larger, 20 deg. is not uncommon. Here let it be said that rapid water flow does not mean a "powerful" pump. Many automobile water pumps are altogether too powerful already. The only requisite is the provision of adequate water passages, in other words, minimum resistance to flow. Radiator cores

of almost all types will pass much more water than the pipe connections.

In laying out pumps the requisite to be kept in mind is to remove from the bottom tank say 75 per cent of the water which can flow down through the radiator on the assumption that the top tank is kept constantly filled with a hose. This should be the capacity of the pump at normal speed, say 1500 engine r.p.m. for a passenger car; and the maximum pumping capacity at maximum speed should not exceed 90 per cent of the possible radiator flow. A vitally important point is that the connection between the bottom tank and the pump should be large enough to take care of 100 per cent of the radiator flow and that the intake of the pump itself should be in proportion.

IF there is any restriction or bottle neck between the bottom tank and the pump intake then the pump may exercise true suction, which is an unscientific way of saying that the pump may produce a reduction of pressure below atmospheric in the line. Water boils at temperatures which vary with the pressure. For instance, at half atmosphere or 15 in. of mercury it boils at 177 deg. Fahr. It is quite usual in automobile systems to find a depression of 12 in. and the writer has seen as much as 19 in. depression occur at 2000 engine r.p.m. In such a case, when the engine is working hard, steam will be liberated in the pump intake, the pump will cavitate, water will be blown out of the overflow and the whole circulation will stop for an instant. In the case cited this happened when the bottom tank temperature was less than 170 deg. Fahr., at which time the top temperature was 190, so that all the ill effects of boiling occurred 22 deg. before they ought to have appeared.

A centrifugal pump of automobile type has a delivery characteristic which increases much more rapidly than its speed. It can be held down to a maximum in two ways, either by determining the proper clearance between the impeller and the casing, or by deliberately choking the outlet. The illustrations are of interest in connection with this point. Two of the cuts show the characteristic of a free pump and of a pump with throttled delivery.

That which has been said regarding the advantages of free and fast water flow is almost a sufficient indictment of the pumpless system which probably gained its limited support owing to the mysterious fascination of the term "thermo-syphon." Water to be circulated in a cooling system has to overcome the resistance of the jackets, the pipes and the radiator. In a convection system the circulating force available is that due to the difference in weight between hot water in the cylinder head and cooler water in the lower part of the radiator.

Suppose the engine jacket contains ten pounds of water and that waste heat is to be removed at the rate of ten horsepower, or for the sake of simplicity, 400 B.t.u. per minute. Now for operating reasons we want the jacket water to be at not less than 160 deg. nor more than 180

deg. Fahr., which means that ten pounds can absorb 200 B.t.u. as they flow through, or that for the temperature conditions stated, the flow must be 20 lb. per min. This is about one-fifth to one-tenth of the proper flow for best radiator efficiency, but that is not the worst of it. Actually it is not practical to carry enough water so that convention will take care of full power operation, so what really happens is that the theoretical system of circulation breaks down. When the outflow of heat from the engine is rapid enough steam begins to form in restricted parts



High speed Curtiss plane with Lamblin radiators mounted in slip stream of propeller

of the jacket, some water is ejected from the overflow and the water then "boils over" into the top tank. This is why top tanks have to be so large in convection systems and why trouble with them usually arises under the condition of continued high speed on level roads rather than on hills. The system contains enough reserve or "flywheel water" to care for hills, but this is soon used up on the straightaway. From that point on, the evolution of heat is faster than convectional flow can take care of and the only possible alternative is boiling. It is a very hard thing to argue, but the writer himself is convinced that the first cost of a reasonably satisfactory convection system with adequate radiator, jacket space and tankage is actually higher than that of a simple pump system, while in operation the power loss due to the pump is much more than compensated for by the saving in weight.

THE writer is well aware that he can have cited against him examples of several cars with convection systems that operate well and have been highly successful commercially. He will only retort that his belief is they would operate still better and be still better commercial propositions with pump circulation.

So far only water flow conditions have been discussed in any detail. In a subsequent article it is intended to take up the intimately associated but none the less separate subject of air flow.

IN a recent report of the National Advisory Committee for Aeronautics it is asserted that our natural gas wells give us a practical monopoly of the supply of helium, and it is recommended that steps should be taken to conserve these resources, which are being dissipated at a rate which threatens exhaustion within a period of twenty years. It is said that helium is escaping into the atmosphere in quantities sufficient to fill four large airships a week. The

report, therefore, recommends that the Government acquire and seal for future use the best helium-producing gas fields, that research work be undertaken with the object of evolving an efficient process for the extraction and refrigeration of helium, and that the Government continue experimental work in connection with airships. It is stated that many successful flights have been made with an airship inflated with helium.

Some Automobile Engines Are Fitted With Longer Pistons

Better foundry practice and pressure lubrication have made possible the use of pistons with longer skirts and greater serviceability without undue reciprocating weight. Much useful information gained from experience with aluminum pistons is being applied.

By J. Edward Schipper

ENGINEERS are, with few exceptions, willing to admit that there are a great many problems concerning the internal lubrication of a cylinder barrel which have so far been solved by compromise. Long before the importance of making the pistons light was realized the practice was to fully consider the guiding function of the piston and to make the skirt of considerable length. Speeds began to get higher, and when it became apparent that the inertia forces were beginning to go beyond a reasonable figure it was realized that in order to save weight it would be necessary to decrease piston length. This tendency was carried by some to such an extreme that piston slap and noticeable cocking of the piston in the bore began to result, with the consequent increase in cylinder wear. Furthermore, it was quite unfortunate that as pistons began to be shortened, connecting rods were shortened also, thereby increasing their angularity and the relative side thrust on the wall of the cylinder. This further augmented the rapid wear of the cylinder bore, particularly since, during all this time, engine speeds were increasing.

The attempt to cure this condition by the introduction of a piston ring at the bottom of the piston skirt has not been a success in all cases. If the ring is too good a fit in the bore, the upper part of the piston is starved and rapid ring wear is likely to occur. If the ring at the bottom is not efficient it might just as well be eliminated as far as a guiding unit is concerned. The natural result is a scraper ring of some sort which will permit sufficient oil to work its way up to the piston ring without permitting an over-supply to get by, thereby causing engine smoking.

ALL of these problems have been on the mind of the automobile engineer for some time, and it is very interesting to note the turn which matters are taking this year. One of the largest production companies in the business has eliminated the ring from the bottom of the piston and is making the piston skirt longer. Two or three

PISTON design has been the subject of more discussion perhaps during recent years than has the construction of any other part of the automotive engine. Considerable experimental work in both design and material has been carried forward both in this country and abroad.

In this article Mr. Schipper discusses the lessons that may be learned from recent experience and shows what the present trend in piston design means. His views on this important subject will be of interest to both engineers and production men throughout the industry.

others of importance in the industry, although perhaps not as large from a manufacturing standpoint, have also done the same. The reasoning behind this is quite obvious. In the first place, foundry methods have improved to such an extent that it is possible to make the longer pistons far lighter than would have been believed possible 6 or 7 years ago. Engine speeds have increased again to such an extent that it is necessary to have the additional guiding surface on the cylinder wall, but to

offset any difficulty which may occur from this tendency, the increased use of pressure lubrication has cut down wear to a remarkable degree.

A great deal of the credit for the development of satisfactory, light weight, cast iron pistons must be given to the aluminum piston. The problems of expansion in the aluminum piston are so acute that, once these have been solved, it is quite simple to solve the expansion problems which occur with cast iron. The turning of the relief, for instance, on the sides of the pistons adjacent to the piston pin bosses has been very effective in securing pistons which fit better after the engine is warmed up.

ANOTHER point which has been learned from the aluminum piston, and which has been successfully applied to cast iron, is in the proper draining of the oil from the cylinder walls, so that an over-supply of lubricant is not passed up beyond the piston rings, even though the oil supplied by the splash or pressure system is in excess of what is necessary for lubrication. It has been found that little difference in the action of the oil reaching the cylinder walls can be noted whether a high pressure, a low pressure or a combination pressure and splash system is used.

In a high pressure system operating at from 20 to 30 lb. per sq. in., the oil stream which is forced out of the end of the connecting rod bearing resembles very closely the spray of oil which is thrown up by the connecting rod scoop in a splash system. In other words, there is no necessity for different piston forms or drain-

ing means because of a difference in the methods of providing oil for the cylinder walls; that is, by splash or by a pressure spray thrown from the end of the connecting rods.

It is interesting, however, with all of these matters in mind to note the tendency toward making the piston a better guide, and at the same time to improve its sealing function. The long-skirted piston designed to prevent the oil from working above the piston rings, and at the same time to drain to the piston pin for lubrication seems to be considered good practice by the engineers who are clinging to the iron piston. From the standpoint of

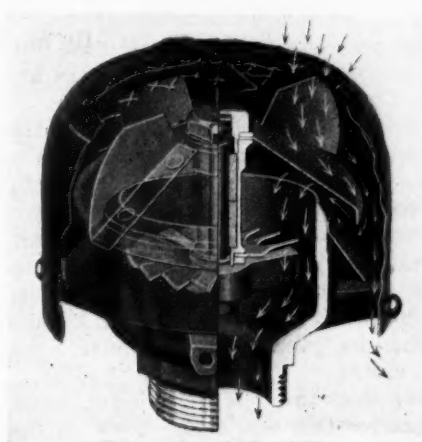
the aluminum piston, it may be pointed out that with the constant clearance types now in use, that very little or no complaint is being heard from service quarters in marked contrast to what occurred when aluminum pistons were first put out, designed according to iron piston ideas. It may also be noted with interest that, owing to the tendency for practically all cars to increase the height of the hood in order to give the straight line effect from the radiator back to the cowl, designers are able to use an engine with a higher block, and consequently can increase the connecting rod length, if so desired. This is one of the big changes on one of the prominent cars for 1923.

A New Air Cleaner

THE importance of the air cleaner in reducing piston and cylinder wear is now well recognized, according to the Standard Oil Laboratories. "An analysis of a great many so-called carbon deposits has shown they are from 20 to 75 per cent silicon or earthy matter which was taken in through the carbureter with the air." Results of these analysis show that in passenger cars used on city streets the percentage of silicon and other earthy matter in the deposit ranged from 25 to 30 per cent, in trucks used in hauling dusty material or on dusty roads the percentage ran as high as 50 per cent, while in tractors it reached the maximum of 75 per cent.

To meet this problem the United Manufacturing and Distributing Company has designed an air cleaner which consists of a shell open at the top and enclosing a centrifugal fan and a driving turbine. The air enters the top, as shown by the arrows in the illustration, coming in contact with the centrifugal fan, which forces the dirt and dust toward the shell, where it is exhausted to the outside. There is no receptacle to catch this exhaust. The air used by the engine takes the path shown by the inside arrows and in its passage to the carbureter it operates the lower or driving fan. The two fans are connected by a hollow shaft, which is closed at the top for a ball bearing support.

The main frame of this air cleaner is cast aluminum. The fans and shell are made from sheet steel .035 in. thick. The weight at the ball bearing is carried on a hardened chrome-nickel disk backed by a felt washer which serves as a cushion. The fan shaft is held in line by oilless wood bearings.



Centrifugal type of air cleaner marketed by the United Mfg. & Distributing Co.

The unit is compact and light. For a 1-in. carbureter the cleaner weighs 1 lb. and is 4 in. in diameter by 4 in. high. For an inch and three-quarters carbureter the weight is 1¾ lb. and the dimensions 5 x 5¼ in.

Once this air cleaner is installed and the carbureter properly adjusted it is said to require no further attention.

There are no dirt receptacles to clean or liquids to add. The action is entirely automatic.

The cleaning efficiency is said to have reached 99.69 per cent in one case, while the average is approximately 98 per cent. In these tests it has been found that the heavier particles of dust, such as silicon, are taken out and the small amount remaining is almost entirely vegetable material, which is relatively light. It is claimed that it is heavier dust which does the damage in the engine cylinders. The cleaner is adapted to a wide range of engine speeds.

Power Losses in Automobile Tires

IN connection with the general investigation of automobile tires and inner tubes, a rather comprehensive program has been laid out by the Bureau of Standards for dynamometer tests to study, among other things, the power losses, or energy dissipated into heat, in tires operated under different conditions of axle load, inflation pressure, speed, temperature and tractive effort.

Preliminary tests have been made to determine the influence of these factors which, aside from matters of design, are the principal items affecting the power loss in a tire. A continuation of the work will involve problems of design and construction, of influence of "oversize" tires and of "cord tires" of power loss, mileage and general

all around efficiency of operation.

An investigation will be made to determine the effects of tire fillers, shields, puncture proof tubes, etc., and the properties of cushion tires will be studied. The equipment used in this work consists of two Sprague electric absorption dynamometers, one of which acts as a motor and drives the wheel carrying the tire, while the other is driven by a pulley bearing against the tire. The power input and output may be readily measured and apparatus is provided for obtaining all other necessary data. Curves are given showing the power loss under different conditions, and formulæ by which the results were calculated are explained.

British War Office Specifies 3360 lb. Truck for Future Use

New truck specifications give British Government idea of truck adapted to both commercial and war needs. Speed wagon type capable of hauling trailer at 30 m.p.h. specified. No English firm is building such units now. Subsidy scheme dropped.

By M. W. Bourdon

THE British War Office has published a specification giving general information concerning the type of motor transport vehicle it has decided upon for future use. The new pattern will supersede the standard 7000 lb. load capacity type which was used principally during the war, and to which the pre-war subsidy scheme applied. The chassis now specified is to carry a useful load of 1½ tons (3360 lb.), run on pneumatic tires, be capable of hauling a light trailer on good roads and have a top speed of 30 m.p.h.

It is made quite clear that there is no present intention to place large orders for this new type, though a few sample chassis have been or will almost immediately be ordered. The object of issuing the specification now is to induce British truck makers to adopt the pattern required as a standard type, for it has to be admitted right away that no British truck maker has in his range of chassis anything which complies with the War Office requirements. There are only one or two existing home products which approach the official needs, for British makers in general have not given serious attention to the fast, light, pneumatic-tired chassis for loads of 3000 lb. or thereabouts; in fact, it can be said that no British chassis designed for goods transport pure and simple is primarily intended to run on other than solid band tires. There is nothing to correspond with the Ford truck at any price, nor with other American chassis that could be named which are essentially suitable for carrying 3000 lb. loads on pneumatic tires.

The War Office, then, is endeavoring to force the hands of British makers; or, put in another way, offering an inducement to them to depart from their maintained policy of designing for solid rubber tires, by specifying a lighter and faster type, but waiving their requirements or modifying the specification on some points so as to ask for a type of chassis which it is believed will be popular for civilian use, and for which actually there is already a demand by private users. The chassis weight stipulated (3250 lb.) is not unreasonable, nor are the performance characteristics; most of the latter are those of certain standard American chassis, though there are a few features—such as number of gear ratios, final drive and brake efficiency—which rule out most if not all of similar chassis now being imported.

It is evident, then, that British makers will have to turn to and design a new model—to modify an existing one will serve in but very few cases—if they are desirous of having a standard type for which they will secure

orders from the War Office when contracts are eventually placed. In complying with the specification there will not be found many features tending to increase the cost of production on account of refinements unnecessary for civilian use, though there are certainly some which will have that effect.

Most of the points brought into prominence are eminently practical, and a considerable amount of latitude is permitted, so that individuality and originality in design are not stifled. There are, of course, some features which even apart from cost will not meet with universal approval, but it is hardly to be expected that the views of everybody could be complied with. There are also some omissions and points of doubt which need rectifying and clearing up. But on the whole it is clear what the War Office has in mind, and that it has not specified its requirements without endeavoring to arrive at a compromise rendering the chassis suitable for private use as well as for military purposes.

Reasons for New Type Chassis

As to the reasons which have led the War Office calling for a type of chassis so entirely different from its hitherto standard pattern, the experiences gained during the war in practically all parts of the world have shown that the heavier type does not lend itself so well to varying conditions of use as the one now sought. On hard roads and under certain conditions the 7000 lb. load vehicle did satisfactory work, but in some theaters of war it failed badly, proving to be extremely uneconomical in money, manpower, road costs and most else. The lighter vehicle, on the other hand, was found more adaptable, and for standardization in time of peace is considered far more suitable, in view of the impossibility of prophesying where another war might take place—in Europe or out of it; where made roads are found or where only soft tracks are available; in the tropics or elsewhere. Future motor transport for the Army must, it is held, be suitable as far as may be for all possible theaters of war, and it is believed that the light pneumatic-tired chassis is the best compromise for military purposes, and also eminently suitable for certain classes of civilian work.

Following is an outline of the specifications:

Four-cylinder internal combustion engine using commercial petroleum spirit; a minimum cylinder bore of 100 mm. (no reference is made to piston stroke). Minimum of 24 b. hp., maintainable for not less than three

hours at a speed equivalent to 22 m.p.h. road speed. Cylinder shape is not specified, but valves must be removable without affecting the cylinder holding-down bolts. It is desirable that in the event of fracture the parts of the valve shall not be able to enter the cylinder.

The lower part of the crank chamber to be removable without disturbing the main bearings, though for engines with ball bearing crankshafts this feature is not essential. Timing chains if employed to be capable of adjustment for wear or stretch. No system of lubrication is specified, but the broad statement is made that lubrication must be insured satisfactorily to bearings and pistons under all conditions. Test plugs to indicate high and low level of the oil in the sump and a plunger type of circulation indicator are required, the latter to be fitted where the driver can feel the plunger. The oil filter must be accessible, large and efficient, and its removal should not involve the loss of the main body of oil.

The "over-type" arrangement is not favored, for it is specified that the engine must not be under the driver's seat. Magneto ignition is stipulated, and if an automatic advance is fitted complete control should be provided for connecting it up to the contact breaker of a standard magneto in case the latter should have to be fitted as a replacement.

A maximum fuel consumption of one imperial gallon per 40 gross ton miles is required, though a lower consumption is desirable.

The engine must be efficiently cooled under all conditions, and if necessary be capable of being easily modified to enable it to function effectively in tropical climates. A water pump is essential, but the circulation should be able to continue by thermo-syphonic action if the pump fails. The temperature of the cooling water must not exceed 100 deg. Fahr., above that of the atmosphere, while provision should be made for fitting a radiator apron for use in cold climates. Provision must be made for cleaning the cylinder water jackets and passages.

The radiator to be supported so that it will not be damaged by frame distortion; it must be of the vertical gilled tube type, with provision for easy repair and cleaning; the minimum bore of the tubes to be $\frac{3}{8}$ in. The filler cap opening to be at least $2\frac{1}{2}$ in. diameter, with a hinged cap secured by a screw fitting without loose parts. The radiator to be protected by a collision bar at least $1\frac{1}{2}$ in. diameter, while the fan, of large diameter, should preferably be driven by a flat belt.

Fuel Supply

The fuel tank should have a minimum capacity of 15 imperial gallons, and the system of supply to carburetor to be such as to insure continuous feed on all gradients up to, and including, 22 per cent and on any road camber. Gravity feed is preferred, the tank having a two-way cock for retaining $2\frac{1}{2}$ gallons in reserve. If a pressure system is used an auxiliary gravity tank holding at least $2\frac{1}{2}$ gallons must be fitted. (No mention is made of the vacuum system of feed, so presumably this is barred.)

The fully loaded vehicle should travel 200 miles on its tank capacity and spare supply, the latter to be contained in two or more 2-gallon tins carried in special

racks forming part of the body equipment. In regard to material for tanks a lead coated steel is not desired, but the following are permissible alternatives: Welded steel, galvanized after making; copper or brass, brazed and riveted and stayed at soldered joints; sheet steel tinned, if tanks are of approved design. A gasoline gage and a removable gauze filter in the filler hole are necessary. The tank filler to be outside the frame and means to be provided for cleaning out the tank.

The Clutch and Gearset

Either a cone clutch or one of the single disk type is permissible; in any case, satisfactory means of lubricating the clutch pilot and withdrawal collar or thrust bearing must be arranged. An efficient clutch stop must be provided, and the whole of the design must be of ample capacity, tending to facilitate gear changing and with accessible means of adjustment.

The vehicle must be able to climb a gradient of 22 per cent on a hard surface with full load, and be able to stop and re-start on a 20 per cent gradient in both forward and

reverse gears. Four speeds forward and a reverse with the selector type of change to be employed. A sketch is given showing the type of "gate" preferred; this has a normal arrangement of gear positions except that the reverse speed position is at the end of a forward continuation of the first-speed slot. Why this design should be considered preferable it is difficult to say, for it involves the necessity for "passing through" the first speed to get into reverse from neutral, and for that reason is not altogether desirable from the driver's

standpoint, while it also encourages a wider spacing of the bearings in the transmission casing owing to the additional length of travel of the first, second and reverse sliding sleeve. Although no direct reference is made to the position of the gear shift lever, indirect references indicate that it must be on the right of the driver, himself located on the right of the chassis.

Nor is any mention made as to whether a unit construction of engine and gearset is preferred or not. In regard to gear ratios, it is laid down that the bottom gear should be about 35 to 1, and the ratio between top and bottom gears about 5 to 1, the reverse gear preferably being lower than the lowest forward speed. The transmission casing must have a test plug to indicate the maximum oil level and provision for driving a speedometer or mileage indicator.

Nothing is laid down as to the propeller shaft, whether it should be open or enclosed, but it is stated that laminated fabric or leather universal joints are preferred, though all-metal universals are not ruled out, but if fitted must be adequately protected. Nor is it stated if an open propeller shaft is used whether the drive and torque may be taken to the springs, or whether radius rods and a torque member must be fitted. The back axle is to be of the "live" type, which rules out one or two British chassis of the specified load capacity which have side chains.

For the final drive, straight-toothed bevels or worm gearing are permissible, and helical bevels may be accepted

THIS article gives in detail the truck specifications decided upon by the British War Office for future use. They are of considerable interest to American manufacturers, since they were developed as the result of a careful study of transportation needs and engineering possibilities.

The type of vehicle specified is not manufactured by any British maker at the present time. The desire of the War Office has been to encourage such manufacture, so that peace time transport needs, as well as war necessities, may be adequately met.

after consideration. It seems probable, in view of the specified top gear ratio of 7 to 1, that worm gearing as an alternative will be preferred by designers. A direct bevel reduction of 7 to 1 is, of course, feasible without an unduly large axle casing, as witness the 8 to 1 direct bevel reduction of the 7000 lb. Saurer. The rear wheels should be detachable from the axle shafts, or the shafts easily withdrawn, leaving the wheels in position in order to free the transmission for towing purposes. It is to be noted that no locking gear for the differential is specified, even although from the military point of view such a fitting would be desirable; it has doubtless been waived as a concession in view of civilian use, in conjunction with the additional expense and complication. For the road wheel bearings the taper roller type is preferred, but plain floating bushes and ball bearings may be accepted.

Axles, Wheels and Tires

The axles, front and back, must have suitable inverted platforms, preferably at the same height from the ground and near the ends, to receive the head of the jack. No tie-rod for the rear axle is to be employed. The wheels to be of the detachable steel disk type, or with approved detachable rims or flanges, and provision must be made for fitting non-skid devices, such as short lengths of curb chain attached by permanently fixed hooks. The pneumatic tires should be of not less than 36 in. diameter, and of the same size front and rear. Large singles are preferred, but twins on the rear wheels may be accepted. A tire pump with an efficient oil filter, pressure gage, cooling and of adequate dimensions, capable of inflating one tire to full pressure in five minutes and driven from the gear box must be provided.

Two independent sets of brakes are required, each capable of stopping and holding the vehicle when fully loaded in either direction on a 20 per cent gradient. The design must permit of continuous application of one brake for a distance of half a mile on an average gradient of 8.5 per cent and at a minimum speed of 8 m.p.h. with the gear shift lever in neutral. Preference will be given to the arrangement consisting of a transmission brake supplemented by a second set acting on the rear wheel drums, the operating gear of the latter being fitted with an equalizer.

In regard to the steering, it is specified that all parts should be of approved design and all joints adequately protected, but the specification apparently leaves to the manufacturer the option of whether he will adopt worm and segment gearing or worm and complete worm wheel. The vehicle must be capable of turning completely on either lock in a space not exceeding 45 ft. wide.

It is specified that fully loaded and on level roads the vehicle must be capable of speed of 30 m.p.h. for one mile and 22 m.p.h. maintained for two hours. It must climb an average gradient of 10 per cent at 8 m.p.h. It need not be fitted with a governor, but if one is fitted this can be removed for any official trials that may be made, if so desired.

Chassis Details

The weight of the chassis must not exceed 3250 lb. exclusive of water, oil and fuel; it must carry a useful load of 3360 lb. and a body weighing 1120 lb. in addition to driver and passenger, together with fuel, water, oil and equipment. The engine and gearset must be mounted on a three-point suspension system. Fitted and driven bolts are preferred to rivets throughout the chassis, and all holes should be drilled.

The following dimensions are specified: Minimum road clearance, 10½ in., preferably more; maximum overall width, 84 in.; maximum wheelbase, 144 in.; maximum

track, 78 in.; minimum track, 54 in.; approximate track desired, 66 in.

The vehicle should be capable of traveling at slow speeds through water 18 in. deep. The springs should be allowed a normal range of 4 in. up and 3 in. down from the fully loaded standing position, the clearances to include provision for a non-skid device. All road springs must withstand a repeated deflection of 3 in. beyond the normal when loaded. A choice of twelve sections of spring leaves is permitted, rising by ½ in. width from 2½ in. to 4 in., and by 1/16 in. thickness from ¼ in. to 7/16 in.

Substantial towing hooks must be provided at the front and rear and provision made for the fitting of a central rear towing eye of the spring buffer type. The frame must be braced against horizontal distortion due to a direct or diagonal pull in any direction up to 20 deg. with the longitudinal axis of the vehicle.

The specified controls are approximately normal, the clutch pedal at the left, brake at the right and throttle pedal preferably in the center. The clutch and brake pedals being marked *C* and *B* respectively, with means for adjusting the slope of the pedal plates. A pull-on brake lever is to be located at the right, well clear of the gear shift lever, and it is mentioned that the levers for throttle and ignition over the steering wheel shall have movement independent of the latter, while the one should move forward to open the throttle and the other move forward to advance the timing. Wires or chains for control connections are barred.

For chassis details, oil lubrication is desired as far as possible, with wick feed lubricators without loose caps. The capacity of the engine lubrication system should be sufficient for 200 miles loaded running, and all lubrication details must work efficiently with the British War Office standard lubricant, of which a specification is given.

Sundries

It is specified that ball and roller bearings should conform with the standards of the British Engineering Standards Association. British standard fine screw threads are desired as far as possible, but the following will be accepted in addition: British Standard Whitworth screw threads for bolts and nuts and British Standard screw threads for brass and copper tubes.

The materials employed should be in accordance with these specifications of the British Engineering Standards Association which apply, and where high-tensile steels are employed the parts should be stamped with the letter "T," followed by the ultimate tensile strength. If materials are not obtained in Great Britain the truck manufacturers must satisfy the War Office that no appreciable delay in obtaining exactly similar materials from British firms will result in case of war.

Reference is made to the desirability of ease of adjustment, lubrication, replacement and repair and to accessibility for inspection. Dimensioned working drawings must be supplied and information given on such points as the number, width and thickness of spring leaves; the number, depth, pitch and shape of pinion teeth; size and threads of screwed parts, etc.

Before any type is accepted and approved by the War Office the following tests will be applied to the vehicles submitted, loaded except where otherwise stated:

Speed. To be tested from a flying start for at least one mile on a level road, and also for two hours on a selected route, which will include gradients up to 7 per cent. For hill-climbing, a test will be made of average speed up a gradient of 10 per cent.

Brakes. Foot and hand brakes will be tested separately with the gear shift lever in neutral on a 20 per cent gradient from a minimum initial speed of 5 m.p.h.

This will be supplemented by the continuous application test already mentioned.

Fuel Consumption. Tests will be made during the average road speed test and then on a level road.

Various. Tests will be conducted over rough ground mainly to try the non-skids and their attachments, the efficiency of the engine cooling system and the springing.

These will include trials on soft sand up to 10 in. deep, on un-metalled tracks with a soft surface and on boggy ground. The effect of frame distortion will be tried by jacking up one front wheel until the other is off the ground; under this condition it must be possible to operate the steering wheel, clutch, brakes, gear shift lever, starting crank, etc.

Small Percentage of Farmers Use Trucks and Tractors

ALARGER percentage of American farms are equipped with tractors than with motor trucks. The 1920 Agricultural Census, recently published by the Bureau of Commerce, shows that 2 per cent of the farms have motor trucks, while 3.6 per cent are equipped with tractors.

South Dakota and North Dakota lead in the use of

tractors. 16.3 per cent of the farmers in South Dakota have tractors, while 15.2 per cent is the North Dakota figure.

The highest percentage for trucks is 14.2, recorded by the farms in the District of Columbia, while Rhode Island is second with 11.5 per cent.

The following table gives the detailed figures by states:

DIVISION AND STATE	MOTOR TRUCKS			TRACTORS		
	Farms Reporting		Number of Motor Trucks	Farms Reporting		Number of Tractors
	Number	Per cent of All Farms		Number	Per cent of All Farms	
United States.....	131,551	2.0	139,169	229,332	3.6	246,083
Geographic Divisions:						
New England.....	7,284	4.7	8,119	2,245	1.4	2,397
Middle Atlantic.....	20,472	4.8	22,011	13,240	3.1	14,140
East North Central.....	24,942	2.3	26,074	55,413	5.1	58,002
West North Central.....	32,331	2.9	33,375	92,123	8.4	97,884
South Atlantic.....	14,716	1.3	15,787	10,460	0.9	11,229
East South Central.....	4,869	0.5	5,153	5,044	0.5	5,379
West South Central.....	8,960	0.9	9,455	17,435	1.8	19,802
Mountain.....	7,168	2.9	7,589	15,865	6.5	17,513
Pacific.....	10,809	4.6	11,606	17,507	7.5	19,557
New England:						
Maine.....	1,061	2.2	1,120	605	1.3	635
New Hampshire.....	663	3.2	717	196	1.0	207
Vermont.....	576	2.0	616	424	1.5	444
Massachusetts.....	3,136	9.8	3,535	540	1.7	592
Rhode Island.....	471	11.5	536	69	1.7	79
Connecticut.....	1,377	6.1	1,595	411	1.8	440
Middle Atlantic:						
New York.....	8,636	4.5	9,259	7,021	3.6	7,407
New Jersey.....	3,075	10.4	3,380	845	2.8	946
Pennsylvania.....	8,761	4.3	9,372	5,374	2.7	5,697
East North Central:						
Ohio.....	6,960	2.7	7,319	9,934	3.9	10,469
Indiana.....	3,501	1.7	3,671	8,871	4.3	9,230
Illinois.....	5,907	2.5	6,154	21,932	9.2	23,102
Michigan.....	4,681	2.4	4,886	5,584	2.8	5,884
Wisconsin.....	3,893	2.1	4,044	9,092	4.8	9,407
West North Central:						
Minnesota.....	3,677	2.1	3,803	14,794	8.3	15,503
Iowa.....	8,669	4.1	8,910	19,427	9.1	20,270
Missouri.....	4,078	1.9	5,059	7,438	2.8	7,889
North Dakota.....	743	1.0	774	11,834	15.2	13,006
South Dakota.....	4,249	5.7	4,353	12,160	16.3	12,939
Nebraska.....	6,333	5.1	6,548	10,342	8.3	11,100
Kansas.....	3,782	2.3	3,928	16,128	9.8	17,177
South Atlantic:						
Delaware.....	283	2.8	304	220	2.2	239
Maryland.....	2,556	5.3	2,805	1,410	2.9	1,525
District of Columbia.....	29	14.2	29	1	0.5	1
Virginia.....	2,389	1.3	2,544	2,206	1.2	2,379
West Virginia.....	886	1.0	936	541	0.6	572
North Carolina.....	2,551	0.9	2,671	2,184	0.8	2,277
South Carolina.....	1,609	0.8	1,736	1,213	0.6	1,304
Georgia.....	2,913	0.9	3,145	2,083	0.7	2,252
Florida.....	1,500	2.8	1,617	602	1.1	680
East South Central:						
Kentucky.....	1,455	0.5	1,538	1,913	0.7	2,029
Tennessee.....	1,362	0.5	1,430	1,796	0.7	1,872
Alabama.....	1,114	0.4	1,180	737	0.3	811
Mississippi.....	938	0.3	1,005	598	0.2	667
West South Central:						
Arkansas.....	973	0.4	1,027	1,423	0.6	1,822
Louisiana.....	793	0.6	874	2,142	1.6	2,812
Oklahoma.....	2,070	1.1	2,155	5,786	3.0	6,210
Texas.....	5,124	1.2	5,399	8,084	1.9	9,048
Mountain:						
Montana.....	1,167	2.0	1,225	6,890	11.9	7,647
Idaho.....	779	1.9	837	1,468	3.5	1,587
Wyoming.....	554	3.5	591	969	6.2	1,075
Colorado.....	2,884	4.8	3,016	4,526	7.6	4,990
New Mexico.....	552	1.8	593	457	1.5	491
Arizona.....	527	5.3	581	820	8.2	930
Utah.....	544	2.1	572	553	2.2	583
Nevada.....	161	5.1	174	182	5.8	210
Pacific:						
Washington.....	3,172	4.8	3,371	2,474	3.7	2,635
Oregon.....	1,728	3.4	1,819	2,902	5.8	3,070
California.....	5,909	5.0	6,416	12,131	10.3	13,852

FRENCH automobile exports for the first six months of the present year show a drop of 2459 tons compared with the corresponding period of 1921. The number of cars exported by France from Jan. 1 to June 30, 1922, is 6408. The countries to which these cars were sent are as follows: Great Britain, 2262; Belgium, 1829; Algeria, 778; Switzerland, 312; Morocco, 195; United States, 145; French Indo-China, 113; Germany, 94; Tunisia, 69; Japan, 62; other countries, 549.

While exports decreased, imports increased for the six months, the tonnage being 3585, compared with 1814 a year ago. This tonnage represents 2171 cars. The greatest number of cars, 1797, came from the United

States, others being Italy, 253; Belgium, 81; England, 24, and other countries 16.

Motor cycle imports into France during the first half of the year represent a value of 1,492,000 francs, compared with 1,252,000 francs for the corresponding period of 1921. Bicycle imports were 7,743,000 francs for 1922, compared with 10,940,000 francs for 1921.

French motor cycle exports show a considerable drop, being only 1,921,000 francs for the first half of 1922, compared with 5,910,000 francs a year ago. Cycle exports, on the other hand, show an increase, the value being 13,653,000 francs for 1922, compared with 9,880,000 francs for the initial half of 1921.

Multiple Sparkplugs and the Suppression of Knocking

Some interesting experimental evidence intended to show how location of the sparkplug and timing of the spark affect the tendency of an engine to knock. A 4.5 to 1 compression ratio can be used even with kerosene as fuel if four plugs are employed.

By C. A. Norman*

THE beneficial effect of two-plugs on power has long been known.¹ The ability of multiple sparkplugs to reduce knock has been emphasized by Hallet and others. In this respect, however, the remarks of Messrs. Dickinson and James at the summer meeting of the S. A. E. in 1921 were somewhat startling. According to them knock could be suppressed not only by multiple spark plugs, but also by simple spark adjustment. And not only could this be accomplished by retarding the spark, as of course was generally known, but it could likewise be effected by

the opposite action, that of advancing the spark.

The explanation of this possibility is however very simple, if we accept the opinion of Sparrow² that detonation is conditioned mainly on the occurrence of a certain pressure. Manifestly, if this is true, it makes little difference, as far as detonation is concerned, whether we keep the combustion out of the dangerous high pressure region by letting it occur comparatively early in the compression stroke, or comparatively late in the expansion stroke. That a reduction of power and perhaps laboring of the engine may be brought about in the former case is another matter.

In this connection, however, it is of importance to keep in mind that the detonation we are talking about is not a peak of pressure, but is a vibration of the engine wall, attended by pressure oscillations in the gas itself. These

latter oscillations have been clearly demonstrated by Midgley³ by means of his high speed indicator. The article here published is one based on the application of this indicator to the study of knock suppression by spark adjustment and by multiple spark-plugs. In this last respect it seems to lead to conclusions that may be of practical value especially in connection with the use of heavier fuels than gasoline in aeronautic engines. With respect to the influence of spark adjustment it simply renders the matter treated by Mr. Sparrow very clear to the eye.

The apparatus used included a single-cylinder, air-cooled engine of 2½-in. bore, forming part of a Delco farm lighting set. For these experiments there were, however, available a number of special heads, furnished by the General Motors Research Corporation through the courtesy of Mr. Midgley. By means of these heads it was possible to raise the compression ratio from the value of 3.3, which is standard for the commercial set, to 3.7 and 4.5, and simultaneously bring into action from one to four spark plugs arranged radially around the circumference of the combustion chamber. The two plugs were diametrically op-

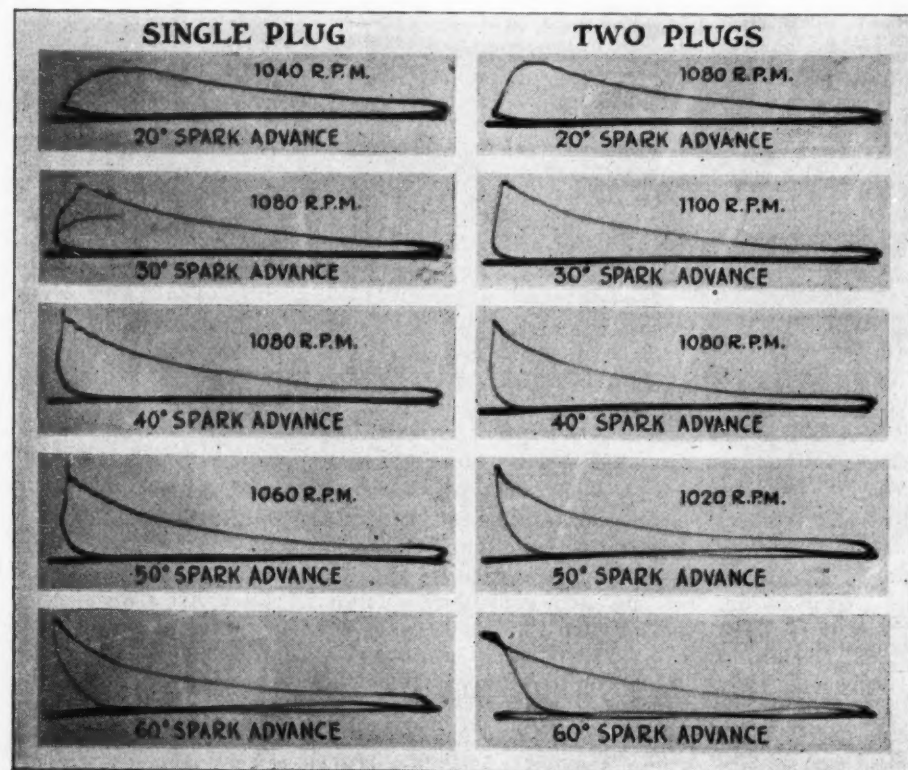


Fig. 1—Indicator cards showing comparative effect of one and two sparks at various spark advance positions in an engine using kerosene fuel at a compression ratio of 3.7

*Professor of Machine Design, Ohio State University. The tests upon which this discussion is based were made by W. G. Wheeler and E. H. Windle.

¹See, for instance, F. Strickland, Petrol Motors and Motor Cars, 1914, p. 62, and earlier tests by W. Watson, Proc. Inst. A. E., 1909.

²Automotive Industries, May 4, 1922, p. 951.

³See for instance Journal S. A. E., December, 1920, p. 493.

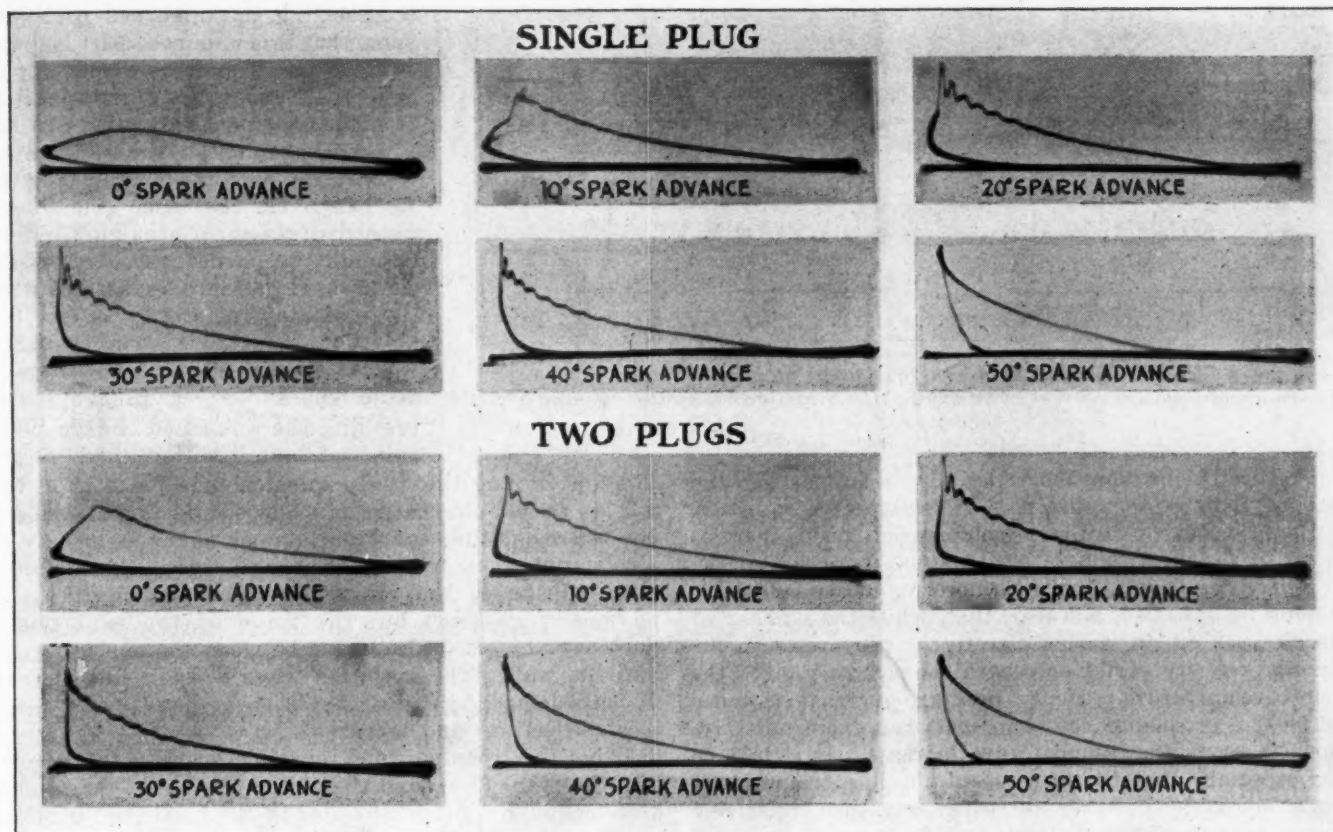


Fig. 2—Cards showing effect of one and two sparks at various advance positions. Fuel, kerosene. Compression ratio, 4.5. Speed, 1080 r p m.

posed to each other; the four plugs were spaced 90 deg. apart. The plugs were actuated by separate coils. The spark position was determined by means of a point attached to an arm adjustable around the axis of the crank shaft, and sparking to a point fixed on the flywheel circumference. The point on the arm was electrically connected to the main spark circuits in such a manner that the angular distance of the arm from dead center was exactly equal to the angular position of the timing lever in the spark circuits.

Results

The results of the tests made are given in the form of diagrams in Figs. 1, 2 and 3. All data are given on the charts. The speed at a compression ratio of 3.7, in Fig. 1, was the same as in the other series.

A study of the diagrams themselves will give more information than any discussion, consequently, the latter can be quite brief.

With a compression ratio of 3.7, as shown in Fig. 1, the gain in card area, that is in power, by the application of two plugs is very marked, for instance at 20 deg. spark advance. The earlier completion of combustion with two plugs is indicated by the sharper rise of the card at the left end. The ideal card is obtained with a spark advance of 40 deg. and two plugs. With this advance there is a distinct knock only when one plug is used. The vibration can be suppressed even with one plug by a spark advance of 60 deg., but only at an excessive sacrifice of power. At this advance, on account of the premature completion of combustion, two plugs give a looped card.

In Fig. 2, with a compression ratio of 4.5 a somewhat different story is told. With this compression and with kerosene as fuel, knock suppression is much more difficult to secure. Even at 40 deg. advance and with two plugs there is a trace of knock left. At 50 deg. the knock is suppressed, but at a considerable sacrifice of power. At 30 deg. the knock is quite noticeable.

A very important fact is brought out, however, in Fig. 3. With four plugs knock suppression is effected at a compression ratio of 4.5, with kerosene as fuel, in an air cooled engine, and at a spark advance of only 30 deg. On account of the small bore of the engine this result may, of course, not be as important as it would be for a somewhat larger engine. A somewhat more general discussion of the causes of detonation and of the wider applicability of the results may therefore be permitted.

Discussion of Detonation

Whatever the cause of detonation may be, the experiments here described seem to indicate that it can be suppressed by letting the combustion waves converge towards the middle of the combustion space, and meet there, rather than to let them impinge against a wall. The question is, why?

Midgley's quantitative explanations of the flame movement in engine cylinders, as observed by Messrs. Woodbury, Lewis and Canby,⁴ is a distinct step forward in the application of strict analytic reasoning to combustion engine problems. Unfortunately, however, he does not explain detonation in detail and as far as he goes, he seems to give no direct key to the predominating influence of pressure on detonation as emphasized by Sparrow. While the diagrams herewith presented do not clear up this point, they appear to give a strong impression of the influence of pressure on the rapidity of combustion. A 10 deg. spark advance with a compression ratio of 4.5 gives as erect a combustion line as a 30 deg. advance with a ratio of 3.7.

Now chemical reaction in gases is nothing else than the breaking up and re-combination of molecules. It is therefore conditioned particularly of the number of molecular collisions per unit of time. Increased pressure at the same

⁴ See S. A. E. Journal, May, 1922, and October, 1921.

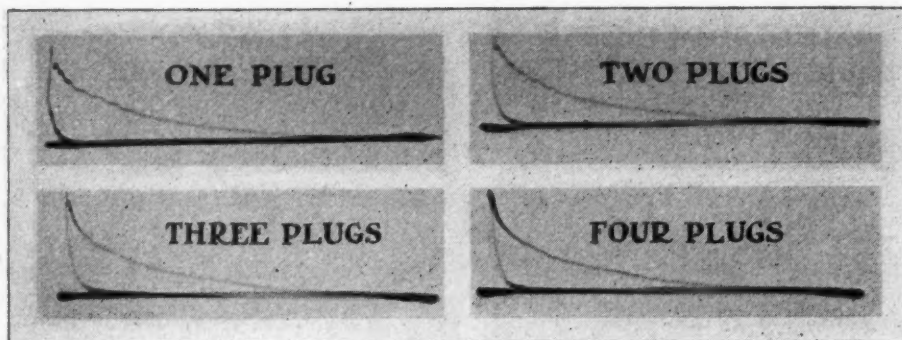


Fig. 3—Effect of one, two, three and four plugs on shape of indicator card when using kerosene as fuel in an engine of 4.5 compression ratio running at 1080 r.p.m.

temperature means more molecules per cu. in. per sec. and hence more chance for collisions. If the increased pressure is brought about by increased compression ratio, there is also an increase in temperature, that is, increased molecular velocity, another source of more numerous collisions. It should be observed, however, that, while the number of molecules per cu. in. varies directly as the pressure, the molecular velocity varies only with the square root of the absolute temperature. Hence pressure increase is more effective in producing collisions and rapid chemical reactions in gases than temperature increase. It should be noted especially that the increase in absolute temperature brought about by compression is, in any case, relatively very much smaller than the increase in pressure. Increasing the pressure tenfold does not even double the temperature. From all this it is perfectly plausible that detonation, which, whatever else it may be, certainly is also a rapid chemical reaction in the gaseous state, should be much more powerfully influenced by pressure conditions than by temperature conditions—within certain limits.

As for the mechanical side of detonation—the knock—Mr. Midgley's discussion, as far as it goes, and the experiments on which it is based, would, on the whole, seem to render the classical idea of this matter, as an engine phenomenon, more plausible than ever. We see the burned part of the charge expanding and driving before it and

compressing the unburned part. Assume that this unburned part is driven against a wall and there suddenly attains the temperature of auto-ignition. It detonates in a body. On one side the explosion deflects the wall and sets it vibrating with the metallic ring that we hear. On the other side the explosion pressure in evening itself out through the burned gas gives rise to those rapid pressure oscillations which the indicator registers.

Under these circumstances there would appear to be two ways to avoid knock; First, to avoid compressing the unburned charge to the point of auto-ignition, and second,

to avoid having the final explosion take place at a wall.

This second alternative is evidently the one attained by the use of multiple spark plugs so arranged as to have the combustion waves impinge upon each other. By this means auto-ignition of the remaining unburned charge is by no means avoided; but the force of the explosion is cushioned by the body of gas between the exploding core and the wall. The explosion wave when it hits the wall is both damped and distributed so as not to give rise to local deflections and vibrations.

From this point of view multiple spark plugs symmetrically arranged around the circumference of the combustion chamber and perhaps also in the head may very well suppress knock also in engines of considerable size. The piston and the head should, of course, be so designed as to make it impossible for the wave to hit any part of them at right angles.

Pitch of the Vibration

While the knock that we hear is a vibration of the wall, which may not at all synchronize with the vibrations of gas pressure in the cylinder, yet it may be of some interest to note that the number of vibrations per second, as registered by the indicator diagram, seems to lie between 800 and 900. This is approximately in the middle of the audible range, about five octaves from either end.

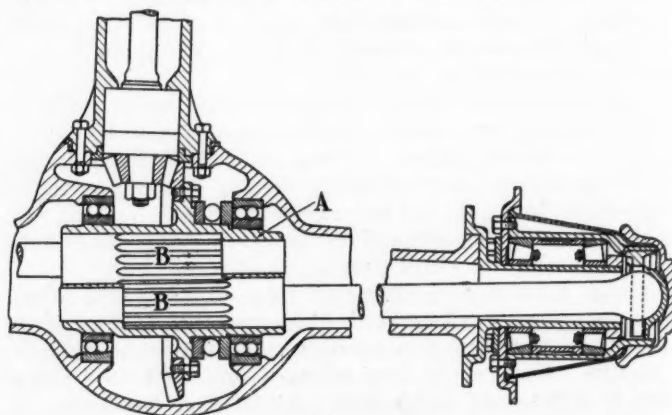
Novel Type of Universal Joint

A RATHER novel differential gear and rear axle construction has been patented in England by A. E. Jeram of Leicester. The object evidently is to reduce the manufacturing cost. Referring to the illustration, the cage A of the gear is bored out with two parallel slightly inclined holes to take the toothed ends of the driving shafts BB. The outer ends of the shafts are provided with universal joints. The cage A runs its ball bearings and is driven in the usual manner by bevel gearing. The toothed parts BB of the shafts, it will be seen, take the place of the planet wheels in the usual differential gear.

At a first glance the design looks very attractive, and it undoubtedly is unusually simple, but there are two points to which attention should be drawn. In the first place, the entire torque of the rear axle is evidently transmitted through a single tooth of a pinion. It seems that an attempt was made to provide for this by making the pinion of considerable width of face, but it is generally believed that an increase of width beyond about four times the circular pitch does not add materially to the strength owing to non-rigidity of the bearings. It is therefore likely that the pinions would have to be made of relatively larger

diameter than shown in the accompanying illustration.

The other point is that if the universals at the end of the driving shaft are of the usual cross-pin or an equivalent type they will tend to cause slight fluctuations in the speed of transmission, which is undesirable.



Novel type of universal joint

Engineering Lessons of the Grand Prix

Magnesium pistons unsatisfactory thus far. Use of roller bearings in engine is receiving much attention. Renewed interest in Knight engine for racing. Panhard experimenting with sleeve with white metal coating. Weight reduction and filter streamlining needed.

By W. F. Bradley

GENERAL approval is expressed in France at the decision of the national club to maintain the 122 cu. in. racing rule for another year. The absence of delay in making known this decision has caused a favorable impression, for in the past the French club has frequently announced its racing rules too late and abandoned them too early.

It is felt that manufacturers have still a lot to learn under the 122 in. rule and most of them a good deal of ground to gain to get on a level with the winning Fiat. The rule naturally tends toward the development of an engine with increasingly high crankshaft speeds and the necessity for lighter reciprocating parts. Among the various problems involved is the use of metals other than steel or aluminum for pistons. The results obtained with magnesium pistons were not satisfactory. The Rolland-Pilain engines had pistons of this metal for the practice period, but after several breakages aluminum pistons had to be substituted. Fiat limited its experiments with magnesium pistons to bench tests, all the road work being done with aluminum pistons. The three Bignan cars which ran in the Fuel Consumption race used magnesium pistons, but owing to the fact that these cars were not in the race for long and were never pushed, little could be learned from their performance.

The use of roller bearings in these small engines is receiving a lot of attention. Fiat seems to have solved the problem with a type of roller bearing designed and built in its own shops, which stood up perfectly on all three cars, when used on all bearings in the engine except those on the wrist pins.

Rolland-Pilain also made use of roller bearings in the connecting rods, but instead of the single row type adopted by Fiat, made use of a double row staggered, each roller measuring 8 mm. diameter by 10 mm. long. Fiat had the same diameter of roller, but one of greater length. While the Fiat construction gave satisfaction, defects which led to the breakage of connecting rods were developed on the Rolland-Pilains.

Positive methods of valve closing, to overcome "floating" at high crankshaft speeds, have been given attention. Fiat worked on this problem for a long time and took out patents covering positive valve closing mechanisms, but decided not to use them at present for racing purposes. The valve springs used were made in the Fiat shops.

Rolland-Pilain had expected to run in the race with a positive valve closing mechanism, but so many difficulties were encountered during the preparatory period that it was decided to change the cylinder head and use spring controlled valves. Bignan ran with a positive valve closing mechanism, but the cars were not tested sufficiently to permit of drawing definite conclusions. In this connection interest is being revived in the possibility of the Knight

engine for racing under limited piston displacement rules. In order to decrease internal friction Panhard-Levassor has been successful in white metalling the sleeves, but as yet the engines on which this has been done have been used only in short distance events.

Ignition is not giving the same trouble as formerly, and both magneto and battery systems are standing up well. Plugs generally are better, but it was seen in the French race that plugs which stood up perfectly in one engine gave trouble when used in an identical engine running at a speed 300 r.p.m. higher.

There is a lot of work to be done to get weight down to the 1434 pounds minimum under the new rules. Only Fiat has succeeded in doing this on cars produced up to the present, some of the others being very considerably above the minimum. Front axle design calls for attention in order to provide for the torsional stresses involved with front wheel brakes. Examples in this connection are the Sunbeam built up axles with H-section center piece and tubular end pieces, and the Fiat design of a tubular two-piece built-up axle.

SCIENTIFIC streamlining called for more attention this year than ever before, but still leaves room for progress. Fiat made experiments on models in a wind tunnel, the work being carried out by its airplane experts, and thus secured the best results. Among the mistakes made were too low a clearance, thus setting up considerable air friction under the car. In the endeavor to include all parts within the streamlining, some designers were led into adopting shapes of an exaggerated section. It is difficult to build a perfectly streamlined body without modifications in the chassis. Fiat had to use bowed frame members, having the same sweep toward the rear as the body. This involved bringing the two rear springs toward the center, in order to enclose them, and thus involved bringing the spring pads nearer the center of the axle instead of near the wheels.

Accurate information concerning the power available from existing 122 cu. in. engines is not obtainable, for the simple reason that every competitor has an interest in giving out erroneous figures. It has been stated that the Fiat developed 96 hp., but there is every reason to believe that the peak was very little above 90. The Sunbeams developed between 89 and 90, and the Rolland-Pilains 84 hp., while Bugatti, in a letter to the papers, declares that one of his 122 cu. in. engines has held 99.78 hp. at 4825 r.p.m. This is more than anybody else claims to have obtained and is a vast improvement on what was secured in the race.

The 122 in. cars will next be seen under test in the Italian Grand Prix on Sept. 10, when for the first time since 1914 Allied makers will have to meet German competition. All who raced at Strasbourg are entered.

Cutting Down Rejections in Pinion Shaft Production

Improved methods in new Hudson axle plant. Novel time-saving devices installed. Pinion roughs out pinion teeth in 6 minutes

By J. Edward Schipper

PROBABLY nowhere throughout the fabricated parts of an automobile is accuracy so essential as in the gears which transmit the drive. This not only applies to the transmission gears, but to the rear axle gears as well. Inspections are closer on these parts than ever before and the result is that unless manufacture has been carefully planned and carried through, the number of parts rejected, due to the careful inspection, are likely to run up to an abnormal amount.

One of the most interesting problems in automobile construction is the manufacture of the pinion shaft. It is customary practice now to forge the pinion integrally with the pinion shaft. This results in a piece which combines all of the problems of gear manufacture with those which would ordinarily be encountered in the machining of a forged blank. The Hudson Motor Car Co. has now in operation an axle plant which takes care of the combined production of Hudson and Essex cars. In this plant a great many novel and ingenious time and material saving methods are employed. It has been developed from a small beginning, until now it takes care of many parts for the main plant in addition to the axles. It is purposed here to follow through the manufacture of the Hudson pinion shaft in this shop. The methods here described have been largely responsible for cutting down rejections and other losses to one-tenth of what they formerly were.

The forged blanks for the pinion shaft are received in this shop from outside. They have been heat treated before arrival, and are all held to a Brinnell hardness range of 4.3 to 4.6 before they are permitted to pass into the manufacturing department. By insisting on this uniformity in hardness, it has been possible greatly to reduce the tool upkeep, particularly in the gear cutting department. Furthermore, more uniform results are obtained all through manufacture and consequently fewer rejections. It has been found that when the metal is too soft, the gear cutters are apt to tear the metal, and when the blanks are too hard, tool chatter and wear increase.

The first machining operation on the blank is performed on a Cincinnati, doublehead, end mill, which cuts to length four of the blanks at a time. The double jig which is shown in Fig. 1 on this machine has been arranged so

that either Hudson or Essex production can be taken care of. The jigs hold four Hudson blanks on one side and four Essex blanks on the other. The blanks are located from the back of the pinion or head of the blank, which fixes the overall length and provides enough stock for the subsequent machining operations. The Hudson shafts are slightly longer than the Essex, necessitating a different set-up when these are being cut.

Following the end milling, the blanks are centered on both ends at once. This is performed on a double ended Cadillac centering machine and location of the part is from the small end so that the same size center will always be on the big end of the blank. This is the pinion end and is termed throughout the shop the head of the blank. A lug or driver is located on the head which permits of holding or driving the blank through several operations. This lug is left on the pinion shaft right through to completion.

Fay automatics are used for roughing out the stem or shaft, Fig. 2. The blank in this operation is located between the centers which have been cut in the previous operations. On this roughing out machine, six diameters and a taper are turned, the Fay having seven tools. For finish turning the shaft, the same sort of a machine with ten tools is employed as in addition to the seven sur-

faces which might have been roughed out, this machine also takes care of the chamfering operations.

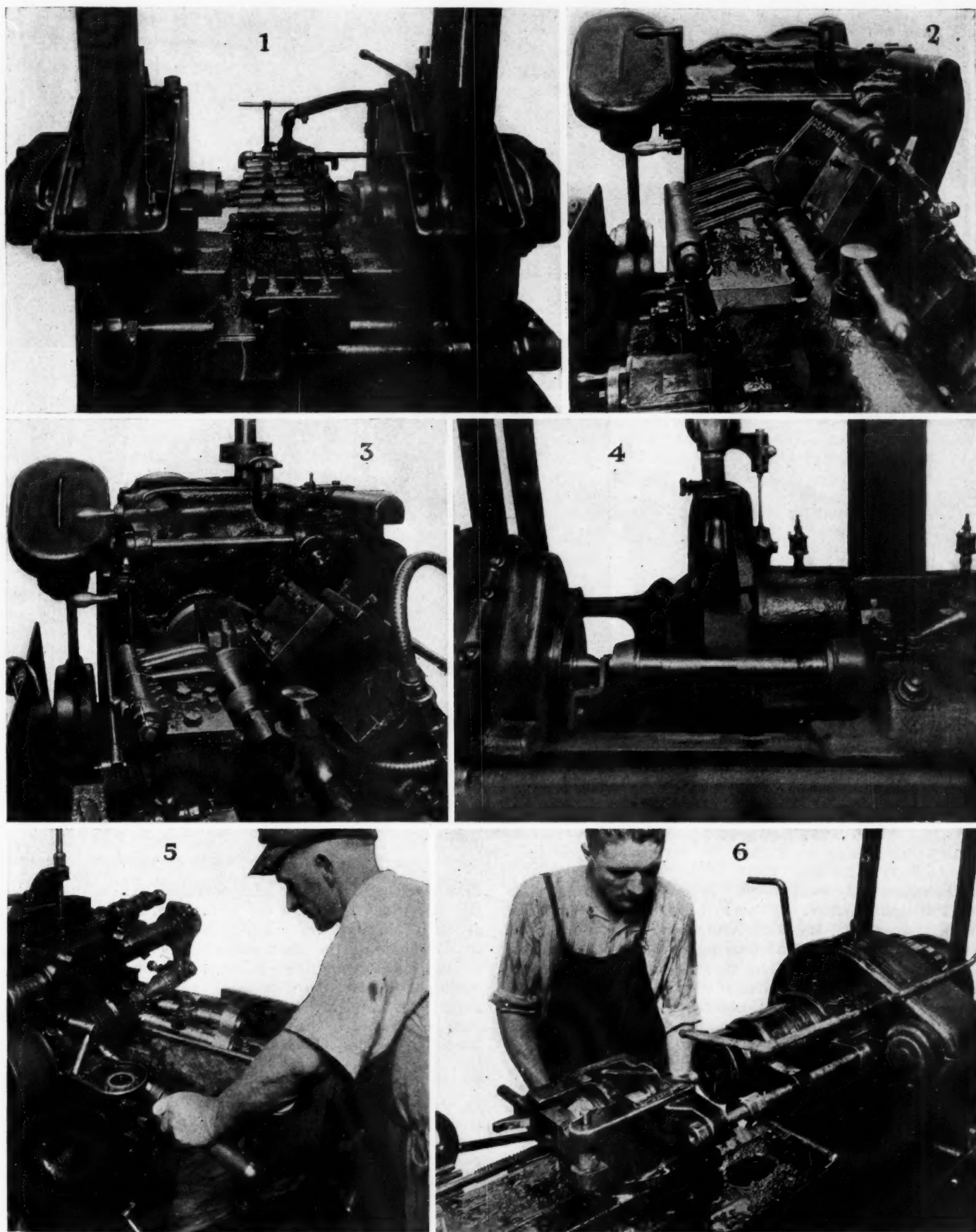
A Fay automatic is also employed for roughing and finish turning the heads or pinions. The turning operations are on the outside and each end of the pinion. The piece is located between centers and is held on a driving fixture against the back of the head. The fixture has a pin engaged by a slot in an arm as shown by Fig. 3, to drive the work.

A preliminary grinding operation is then performed on the two pinion shaft bearings. This is not a finish grind, but is for the purpose of fitting the shaft to the Gleason adapter which holds the piece in the Gleason machine which cuts the pinion teeth. The grinder is of Pittsburgh manufacture and employs a grade 24, C-M wheel. The work is located between centers in this operation, Fig. 4.

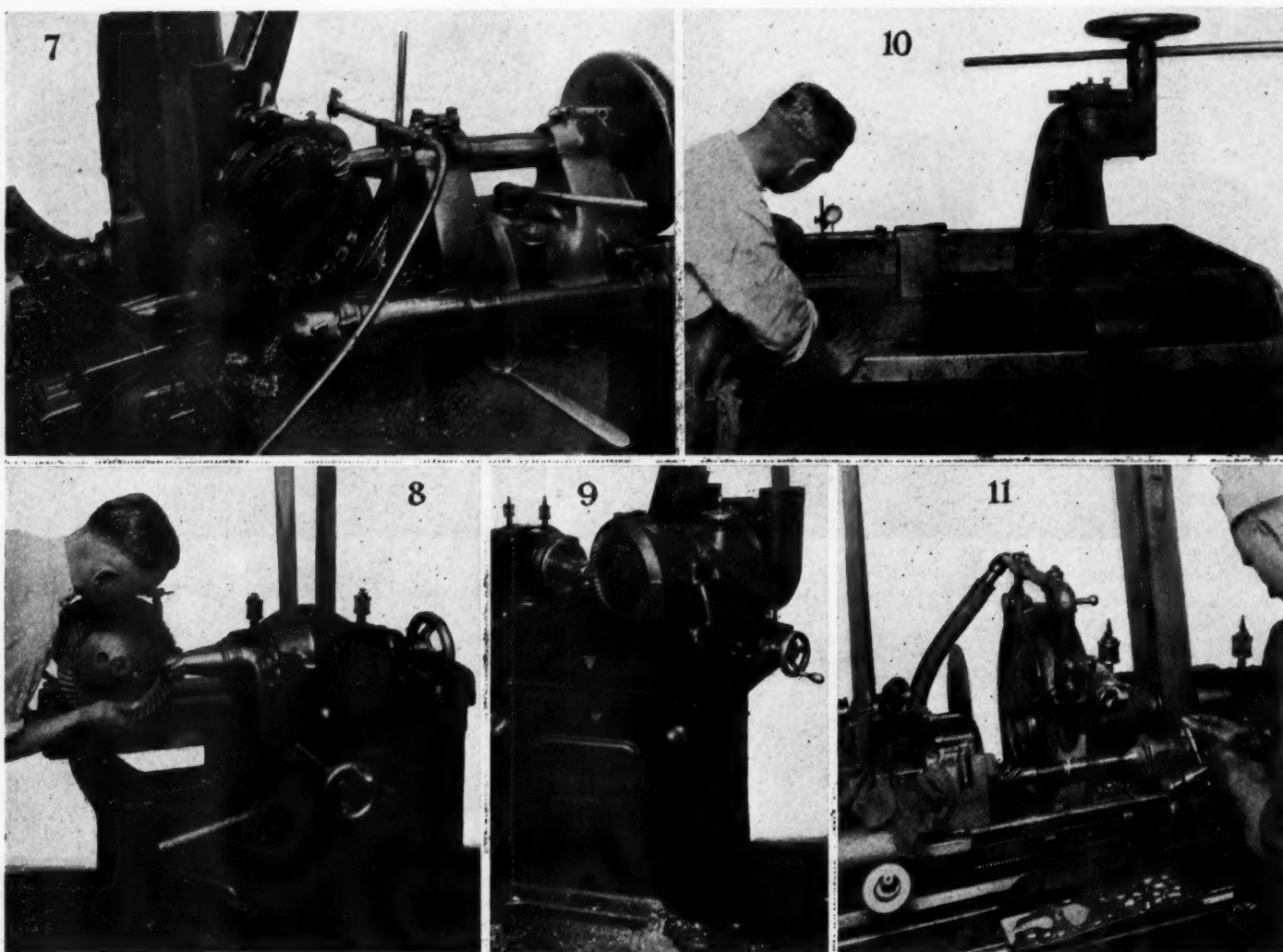
Two keyways are simultaneously milled in the stem. A large keyway is milled on one side and a small keyway

HERE is a detailed description of how pinion shafts are made in an up-to-date axle plant. The story discusses each operation, while the photographs illustrate the details clearly.

Very close inspection is maintained on these parts. Consequently, the progress that has been made in reducing the number of rejected parts is worth special notice. This article tells how this desirable result was accomplished.



1—Cincinnati double head end mill which cuts to length the pinion shaft blanks. This machine handles either Hudson or Essex production with a slightly different tool set-up for the increased length of the Hudson blanks. 2—Roughing out the stem or pinion shaft on a Fay automatic. The shaft is located between centers and driven through the lugs on the heads. 3—Rough and finish turning the pinions on a Fay automatic. The outside and each end of the pinion are turned. 4—Grinding the two bearings on the pinion shaft to fit it to the Gleason adapter. 5—Milling two keyways for the key and lock washer in the end of the pinion shaft. This work is done on a Toledo hand mill. 6—Cutting thread on end of pinion shaft with Warner-Swasey hand screw machine equipped with Amco die head. Note slotted clamp in end of fixture to hold driving lugs on pinion



7—Cutting the teeth in the pinion on a Gleason machine. The pinion shaft is held in an adapter on the two ground bearings. 8—Inspecting pinion teeth by running them in with ring gears on running-in machines. 9—Burnishing the pinion teeth by running them against a specially hardened ring gear with red lead. 10—Checking the pinion shafts for any distortion which may have occurred in heat treatment. The checking is done by amplifying gage as shown and the screw press for bending is shown to the right. 11—Norton grinding operation on the two pinion shaft bearings. This is the final operation on the pinion shaft

on the other. The small keyway is for the purpose of holding the lock washer. A Toledo hand miller is employed for this operation, the work being located from the head and from the two ground bearings which fit in V-blocks on the fixture, Fig. 5. The shaft is then threaded with a 1-3/16 in. diameter 20 pitch thread on a thread mill and the end of the shaft also threaded to 3/4 in. diameter 20 pitch on a Warney-Swasey hand screw machine with an Amco die head. The interesting point about this operation is the special fixture which is shown in Fig. 6 for holding the work. It will be noted that there is a slot in the clamp which slips over the driver on the end of the pinion, holding the work stationary while the die head performs the operation.

A cotter pin hole is drilled and counter-sunk in the end of the shaft. This is handled on a two-spindle speed drill. A burr is thrown up on the end center by this operation and in order to remove this, there is a special burring operation at this point, the center being cleaned out on a Foote-Burt drill. The blanks are then passed along to a bench where they are given a 100 per cent inspection before they go to the Gleason machine for cutting the pinion teeth.

It requires about 6 min. for pinion to rough out the pinion teeth on the Gleason machine, Fig. 7. The work is held in an adapter on the two ground bearings which

have been provided for the purpose. As a support to the pinion shaft, a draw-bar is screwed on the end of the shaft. The roughing machine leaves from .005 to .008 in. for finishing the teeth and this operation immediately follows that of roughing. After the pinion shaft leaves the machine, the teeth are tested by running them in with ring gears, Fig. 8. The surface of the pinion and ring gear are coated lightly with red lead and allowed to run together on running-in machines with from .005 to .006 back lash. This inspection catches any "run-out" either by the irregularity of the sound or by showing irregularity in the removal of the light red lead coat. The test is not made against master gears but against ring gears from stock, although the testing room is provided with master gears to make special tests should they be necessary.

After the gears have satisfactorily passed the running-in test, they are hand burred by file and taken to a Gleason burnishing machine where the pinion teeth are burnished in against a hardened ring gear, Fig. 9. The burnishing is accomplished by running the teeth in with red lead against the ring gear which has been specially hardened for the purpose. The ring gear is used only for a short time and then passed along into production. This work does not impair the ring gear but really improves it.

A bath of kerosene is given the pinion shaft to remove grease and the red lead paint from the burnishing opera-

tion, etc., and they are then given to the heat treating department where they are carburized, wire brushed, hardened and drawn, wire brushed again, inspected for hardness by scleroscope and returned to the shop. Both centers are cleaned out with carborundum pencils on a speed lathe and the pinion shafts are then checked for any distortion which may have occurred in the heat treating process. This is removed by a hand screw press, Fig. 10. The checking for distortion is done with an amplifying gage, a very close limit being allowed at this point.

The pinion shafts are now ready for the final operation. The two bearings, which have only been ground in a preliminary manner to fit them to the Gleason adapter, are now finish ground to their correct size and the taper also finish ground on a Norton grinder, Fig. 11. The work

on this operation is held between centers and driven by the driver which remains on the end of the pinion. The grinding operations are inspected with snap gages and micrometers and a taper ring gage is employed to check the taper grind. They are then taken back to the silence room, paired up with ring gears with which they are mated by running them in together and making a careful inspection for noise, out-of-round or any inaccuracies which may have come through to this point. The experience of the shop is that by the time the pinions have reached this point, they are practically interchangeable and no difficulty is found in securing proper mating of the pinion and ring gear. The pinion shaft and ring gear selected are put in racks together and then passed along to the assembly department.

Germans Study Light Alloys in High Speed Engines

IN the *Zeitschrift für Metallkunde*, Dr. Ing. von Selve reports the results of some recent experiments in connection with the use of light alloys in high-speed engines and other parts of automobiles. He refers to a previous article by himself in *Der Motorwagen*, describing the six-passenger 8/30 hp. Selve car, and says that the aluminum rims used on the wheels of that car have run more than 3000 miles over rough roads without showing any signs of distress. He concludes that if aluminum can be used to advantage in the wheels, it can also be used in other parts of the automobile. For instance, the license plates could be made of the light metal, and Selve says he has been using such license plates now for many months, with a saving in weight of more than 1½ lb. About 45 lb. of car weight could be saved if the main frame and the subframe were made wholly or in part of aluminum, and experiments along that line have been started. It is suggested that several parts now made of brass should be made of aluminum.

A decrease in the weight of reciprocating parts is always a gain, as it results in increased power, decrease in bearing pressure, decrease in engine vibration, increase in speed of revolution and in pick-up. To attain these objects in the highest degree it is necessary to first study the most important qualities of the two light commercial metals and their most advantageous alloys. Following are the chief characteristics of the two metals:

	Tensile Strength, Lbs./sq. in.	Elongation Per cent	Specific Gravity
Aluminum			
Cast	28,000 to 35,000	1-1.5	3.0
Rolled	42,000 to 48,000	4-6	2.9
Pressed	45,000 to 51,000	2-4	2.9
Magnesium			
Cast	20,000 to 25,000	5-6	2.0
Pressed	40,000	8	2.0 (appr.)

It would appear from these figures that aluminum is not a satisfactory substitute for high-grade steel with a tensile strength of 110,000 lb. per sq. in., an elongation of about 15 per cent and a specific gravity of about 8, considering that it is also more subject to fatigue than steel. In practice aluminum does make a good substitute, for two reasons, (1) because the heavier sections needed with aluminum give better assurance against defects in castings, and (2) because the thickness of steel sections often must be made greater than required by considerations of strength alone.

Selve claims that pistons cast in metal molds are superior to others because the thickness of the walls is always uniform and the cost of machining is greatly reduced. In addition, the metal molds last about twice as long as the best wooden patterns.

The serviceability of magnesium pistons has already been proven by tests. Whether they have a satisfactory life remains to be seen, as their temperature conditions are not as uniform as those of aluminum pistons. A remarkable saving in weight can be effected.

Sheet aluminum pistons are drawn in one piece and possess the advantage that they have absolutely uniform wall thickness, permitting of the use of thinner walls and eliminating all machining. The problem of securing the piston pin has been solved. The weight and thickness figures given in the following compilation were determined on a Selve engine of 81 mm. bore and 100 mm. stroke.

Cast Aluminum Piston; Sheet Aluminum Piston; Magnesium Piston

Properties	Cast Aluminum Piston	Sheet Aluminum Piston	Magnesium Piston
Weight, lbs.	0.55	0.617	0.55
Tens. str., lbs.	25,400	35,000	22,800
Elongation, per cent ...	1.0	8-10	5-6
After approximately 50 hours' operation			
Tens. str., lbs.	25,500	31-34,000	17,700
Elongation, per cent	0.5-1	8-10	4.5

The test consisted of about twenty hours running on the block and about 600 miles run in an automobile.

Selve has also been attempting to reduce the weight of the connecting rods, and made tests with pressed magnesium rods, with results which up to the present have been very encouraging. Two sets were subjected to a twenty-hour test on the test stand and then used in various automobiles for nearly 1000 miles, and no deformation can be noticed as yet.

Before the endurance test the weight and strength figures were as follows:

Properties	Steel Rods	Magnesium Rods
Weight	1.6 lbs.	0.66
Tens. str., lbs.	120,000	39,600
Elongation, per cent	8	8

After the above-described tests the figures were:

Tens. strength	35,400
Elongation, per cent	5

The aggregate weights of the connecting rods and pistons for a four cylinder engine of 3.19-in. bore and 3.94-in. stroke are:

Cast gray iron piston and steel connecting rod.....	13.6 lbs.
Cast aluminum piston and steel connecting rods.....	9.5 lbs.
Sheet aluminum pistons and magnesium connecting rods	5.5 lbs.

In order to take full advantage of this weight reduction it is necessary to increase the speed of revolution. It should be borne in mind, however, that this weight reduction is the means of prolonging the life of the working parts and of reducing the load factor of the engine.

Designing Camping Cars and Trailers

Growing demand promises good market for properly designed camping outfit. Compactness, light weight, good appearance and low cost essential features for trailer. Standard axles suitable.

By Harry Wilkin Perry

RAPID growth of the motor camping movement indicates that a coming development of some importance is the camping vehicle. Tens of thousands of motorists make annual camping tours and the number is increasing each year. To accommodate these "sage-brushers" and "tin-can tourists" there are free camping grounds in each of the national and state parks, provided with pure water, sanitary arrangements, free supply of firewood and, in some cases, with pavilions for amusements, laundry work, etc.

Hundreds of similar grounds have been established by municipalities throughout the West and in parts of the South and East. Several campers' guides are published, giving the location of these camp grounds and the facilities afforded by each. One of these guides lists about 1000 and has a sale of more than 10,000 copies a year.

Camping lends a new interest to touring and the inexpensiveness of living out of doors enables the tourists to make much longer trips than they could otherwise. New possibilities are opened to the car owner in the way of pleasure, utility and return on his investment. The increase and permanence of motor camping are therefore not to be doubted.

This can be turned to advantage by the automobile industry through the exercise of ingenuity and business acumen. At present most of the tourist campers carry folding tents and other equipment on the running boards and in the rear part of their cars, and the money spent for such paraphernalia goes through the sporting goods houses to the makers of the equipment instead of through automobile dealers to car and body makers.

About a dozen makes of camping trailers are in the market and are selling in limited numbers, and there has been a noteworthy number of enthusiastic camper-motorists who, unable to find anything in the market to meet their wants, have spent much time and money in building or having built special camping bodies mounted on truck chassis. Some of these have been fitted up very elaborately. It is an indication that a well-designed camping body put out as a manufactured article and selling at a reasonable price would have a good reception.

In approaching this matter, the question at once arises: What is the best sort of camping outfit to build? The answer can best be found by considering what the largest

number of persons will want and what construction will best meet the requirements. The chief essentials may be set down as follows:

1. Portability.
2. Ease of manipulation.
3. Comfort.
4. Convenience.
5. Moderate price.

Now, consider briefly the advantages and disadvantages of the different kinds of motor camps.

Tents.—These are outside the province of the automobile and body designer, as they require no change in the car. They must be erected and taken down at each camping place; the ground serves as the floor, and there is much packing and unpacking of the whole camp equipment to be done. Cooking and eating outfits, including folding table and chairs, all compactly stored in a case, may be carried on the running board.

Some tents have a ground cloth and also a protective cover for the car. The equipment and personal

luggage of the passengers weigh down and encumber the car. When camp is made, the car can be used independently.

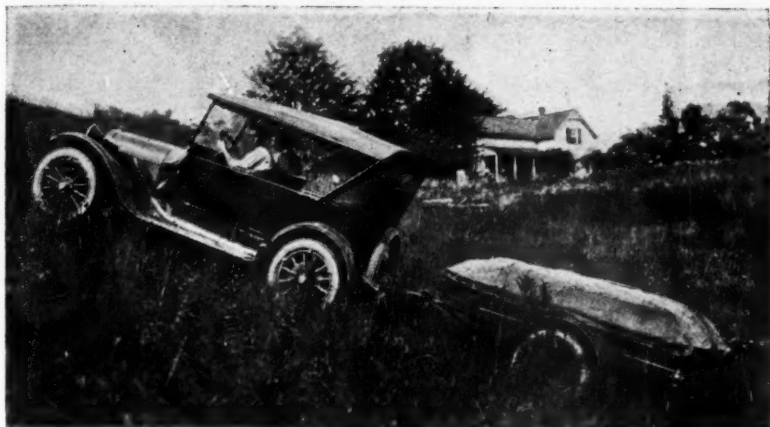
Trailers.—All equipment and luggage is carried in the trailer. Tent and beds are built on the vehicle and floor and beds are well above the ground. Tent or top may be raised easily and quickly. Equipment includes stove, ice-box, food compartment, table, chairs, cooking utensils, and may include a wardrobe, folding toilet and water tank. The car can be disconnected and used independently.

Among the disadvantages are the towing of a weight of about 1000 pounds, possible difficulties of passing other vehicles in narrow, rutted roads, the impossibility of turning around in narrow places without uncoupling the trailer, storage of the trailer in small private garages when the camping season is over and the cost of a camping trailer that may be used only one or two months in the year.

Camp Cars.—The camping body mounted on the motor vehicle chassis avoids the popular objections to the trailer and the disadvantages of the tent, and may have the comfort and appointments of a snug little bungalow. Everything is self-contained, the running boards are not cluttered up and there is no tent to be put up and taken down. A minimum of work is required in making camp, so it is well

THE last few years have witnessed a marked increase in the use of motor camping outfits. The perfect design for such vehicles has not yet been made.

Harry W. Perry, the writer of this article, has had a wide experience in the trailer field. Here he gives his ideas about the design of suitable trailer camping outfits. His discussion is interesting and pertinent.



1—The camp trailer will follow a car anywhere the car can go



2—The business end of a motor camp is the kitchenette and dining table

suited for long trips with one-night stops. It must be substantial in construction and lends itself readily to heating when used for fall hunting and fishing trips.

The camp is inseparable from the car, however, and must be closed every time the car is used. Most such bodies have been mounted on truck chassis and are cumbersome and ungainly in appearance. They are unsuited for other purposes, and must either be removed from the chassis at the end of the season or both body and chassis allowed to stand idle through the winter.

It is hardly possible to combine all of the advantages of the several types in one, but the nearer the designer can come to realizing this the greater will be the demand for and success of his product. Both the trailer and camping body offer promising fields for development. The former is being rather widely exploited but the latter is almost virgin ground, so far as the manufactured article is concerned. If the designer decides to turn his attention to the trailer as the more desirable and the easier to work out, he may either undertake to improve on present constructions or to reduce the cost of production, or both. If he takes up the camping body, he will be confronted with many difficult problems. In either case, he will want to avoid infringing existing patents.

When contemplating the design of a trailer, due consideration should be given to compactness, light weight, appearance and low cost. The prospective buyer hesitates to invest \$300 or more in an article to be used perhaps only one or two months in the year and for which storage will have to be found for the remaining ten or eleven months. This can be overcome to some extent by making the camping outfit readily removable so that the trailer can be used for haulage purposes after the touring and camping season is over.

Compactness and Light Weight

The greatest disadvantage of the trailer will be overcome if an automatic steering mechanism can be devised that will cause the trailer to back in the circle described by the wheels of the car. Any such mechanism, however, must not allow sideway or weaving of the trailer when drawn forward at high speed. Much study has been given to this problem by trailer manufacturers, who have solved it fairly well as far as the four-wheel trailer is concerned.

One probably cannot do better than to buy standard wheels, axles and springs, but roller bearings have been found preferable to ball bearings. A wooden floor is desirable but the body sides may be either of wood or sheet steel—each has advantages. The main consideration is the camp superstructure.

A tent of cloth is most commonly used, as it is light,

cheap, readily made to fold compactly, and easily made insect proof. But the designer may employ stiff panels of sheet metal, plywood or composition. These exclude cold and dampness better and present a better appearance. A stiff, solid top is better than a cloth top, as it does not have to be raised so high to give full head room, and when lowered affords better protection for the contents of the trailer body. The lower the top of the trailer when camp is folded for traveling the better. It is preferable to keep the height above the floor within one and a half to two feet.

Sleeping Equipment

The beds, when in sleeping position, should be outside of the trailer body, while in traveling position they must be inside. These requirements, together with the necessity of raising and lowering the top, afford an opportunity for the exercise of much ingenuity. Simple mechanism for raising the top and extending the beds simultaneously by a single operation is indicated. Top and beds should be self-locking in position so there will be no need of further operations, such as tightening clamps, tying of ropes or buckling of straps.

Beds are one of the most important items. Sagless wire springs and silk floss mattresses are entirely satisfactory. The bed frames may be of hard wood or angle iron, and made to fold into the trailer body or to slide inward one above the other. Any bed less than four feet wide and six feet long will not afford the comfort it should for two persons. It would be better to make it 52 or 54 inches wide and 74 or 76 inches long. In that case the trailer body will have to be equally wide or the bed frame hinged to fold on itself. In any case it is important to construct the beds so that all the bedding can be left in place on them when closing camp, so that the beds will not have to be made up for sleeping when making camp again.

Whatever protective covering or top is used, it ought to be attached to the beds so that it will be extended automatically with the beds. This will not only avoid a separate operation but the beds will be fully protected if it should be raining when camp is set up. If the cooking outfit, food compartment and icebox are located under the floor of the trailer and accessible only from outside, it means a good deal of discomfort in case of rain and considerable work in carrying things inside and preparing a meal. Preferably the compartments should be accessible from both inside and outside. It is a great convenience to be able to stop when passing an ice wagon on the road and have a piece of ice put in the box without having to open the trailer, and to buy milk, fruit, vegetables and other provisions along the road and store them away with the least trouble. It also means much to be able to pre-



3—Setting up a folding camp trailer is the work of only a few minutes



4—Everything complete

pare an appetizing lunch, with hot or cold drinks, without opening the body of the trailer.

This suggests the need of some sort of kitchen cabinet in which stove and ice box have their places, and a one-hole or two-hole fireless cooker, if possible. Such a cabinet might be made in several sections hinged together so that they could be folded down on the floor or even under the floor when on the road and set upright when camping. Each individual section, of course, would have to remain in vertical position at all times. A water tank in the cabinet, with a faucet, will be a very desirable addition, as safe drinking water is not always available at places where camp is made and a long trip to find water before supper can be prepared is not relished. A capacity of two or three gallons is none too much; more is better.

Provision for Clothing

Provision for extra clothing and miscellaneous toilet articles is likely to be given too little attention. No great amount of space will be needed but suit cases, grips and small steamer trunks are unsatisfactory. Clothing gets mussed and creased in them, they are always in the way and it is a nuisance to keep putting things in and taking them out. A special wardrobe or wardrobe trunk in which clothes can be hung on hangers and which can stand upright when camping and lie flat when traveling would be handy and keep suits in the best condition for use at hotels or when walking on the streets in town. Space is so limited in a motor camp that it must all be utilized to advantage. The best way to do this is to arrange a place for everything. Small drawers in the wardrobe for toilet articles will keep them out of sight and from getting lost in confusion.

Space should be allowed in the trailer when closed for at least four folding chairs, a folding table, a folding toilet and tent, a fly tent and several implements such as a spade, an axe, a bucket, coil of small rope, etc. The fly tent adds fifty per cent to the comfort and enjoyment of a camp, for cooking and eating will want to be done out of doors most of the time and the fly affords shelter from sun and rain.

Development of a camping body to be mounted directly on the chassis of a motor vehicle presents many of the same problems as the trailer, plus others. There is a limited but worthwhile market for a strictly camping body for speed wagon chassis and this is a simpler undertaking than a camp body for passenger car chassis that can be used also for ordinary passenger purposes during all seasons. The speed wagon body may be larger and may even have a fixed top standing six feet above the floor, although this is objectionable. It may also be rectangular, with straight lines, and have panel sides, which simplifies the work of designing. The fact that the chassis has straight side frames

with no kick-up over the rear axle is also an advantage from the standpoint of the designer and constructor.

The object to be aimed at is to evolve a body that will be suitable in appearance and comfort for touring purposes and that will embody all the equipment and conveniences of a satisfactory camp. Few persons will be willing to tour in a van-size body mounted on a heavy truck chassis, therefore width preferably should not exceed 60 inches nor the height from the floor the same. Length, to be in proportion, may be 8 to 9 feet. As a body of these dimensions would be entirely too small for use as a camp, ways need to be found to increase them so as to provide standing room and places for the beds so that they will not occupy all of the floor area.

The most obvious way to get headroom is by raising the top about a foot and a half. Simple as this idea is, its accomplishment presents many difficulties and the use of several mechanisms for the purpose is covered by patents issued and applied for. Those already covered by American and foreign patents include the following:

1. Upright supports formed in two parts, one part secured to the floor and the other to the top, the latter sliding against or within the former, and a system of steel cables and pulleys so attached to the parts of the uprights and to a shaft under the floor of the body that the turning of the shaft winds up the cables and raises the upright members attached to the top.
2. Upright telescoping tubes secured severally to the floor and the top, in combination with lever rods secured to the top and to corners of beds hinged on the uprights so that as the beds are lowered into horizontal position the rods force the top up.
3. Vertical screw rods attached to the top, worm nuts rotated on the rods by means of a shaft under the floor and gears to rotate the nuts.

Undoubtedly other constructions can be devised without infringing protected constructions. It is an interesting problem.

As in the trailer, the beds almost of necessity have to project outside of the main part of the body. There are various devices for sleeping in automobile bodies but they leave no room for dressing and undressing or for other use of the floor space, and they accommodate only two persons. It is not difficult in a commercial body to attach beds to hinged panel sides to let down into horizontal position, but a body of this type is not desirable nor readily marketable for touring.

Comfortable Riding Seats

Comfortable riding seats for four are wanted by day, with open body sides and with plenty of room for legs and feet. Beds six feet long will be in the way, whether they stand on edge or fold up inside the body.

A possible solution lies in making folding seats that can be opened into beds and moved from the interior to the outside of the body. Here again there is danger of interference with existing patents and applications, especially in the davenport bed class. Excessive weight of such combination seats and beds is to be avoided and some means found for easily shifting them from riding position and supporting them in sleeping position.

Then comes the problem of providing the covering to exclude rain and insects but admit light and air. Whatever material is used, some means of storing it out of the way and out of sight within the body when on the road is desirable. It is always to be borne in mind that the salability of a camp body depends largely upon its good appearance and the cleverness with which its real purpose is concealed. No one objects to a camp car looking like a camp when it is being used as such but he does not want it to look like a camp or a truck when it is used as a vehicle for touring. It seems probable that the demand will lead to the evolution of a new type of body having some of the characteristics of both the touring car and the light commercial vehicle, but it will need to be a happy combination and not a monstrosity. A rear door or doors may be admissible if not too obvious but there must be no evidence of beds, tent or other camp equipment.

As it is highly desirable to avoid the need of removing the camp body and storing it at the end of the season and substituting another for ordinary use, a great deal of study will need to be given to the problem of designing a convertible body. Any means adopted for raising and lowering the top must have tolerance enough to work easily and yet must not be so loose as to rattle when riding. Some way must also be devised to secure the top rigidly so that it will not sway and the joints creak when the car is in motion.

All the culinary, lavatory and wardrobe equipment should be so arranged that they can be installed and removed with a minimum of effort and time by the ordinary layman. One of the popular uses of a camp car will be for week-end trips at other than vacation times, yet owners will not want to carry the equipment in the car six months in the year.

It will be natural to take advantage of the presence of a supply of gasoline on the car to furnish fuel for a gasoline cook stove; of a storage battery to furnish interior lighting when camping, and of waste heat from the exhaust to heat water for laving and dish washing.

One of the difficulties is to make the camp car both weather and insect proof. Waterproofed cloth suggests

itself as most feasible, but it is worth considering if some material of a different nature will not be preferable.

Excessive weight, structural weakness, rattle, leakage and high cost are dangers the designer needs to guard against.

There are some possibilities in the designing of a camp car for two that will be simpler and less expensive than a four-party camp car and for which there should be considerable demand. The bed might occupy the body space completely and the top would not need to be raised to give head room. In this case a cloth "lean-to" or tent could be provided to be attached to the top and side of the car, like some of the motor tents. This would make a serviceable dressing room, high enough to stand erect in with the ground, covered with a ground cloth attached to the tent, serving as a floor. In bad weather or when insects are very troublesome—as unfortunately happens frequently—cooking and eating could be done in the little tent. Incidentally, at meal time the running board serves excellently as a seat for two. The side doors would give easy access to the bed—far easier to get into and out of than the upper berth of a Pullman. If the design embraces a double-seat car, the four seat cushions laid flat and side by side, would form a comfortable and ample bed.

Coupe Type

Even a coupe type body may be designed to be extended rearwardly by means of rear doors and an extension top so as to provide cover for a full-length bed for two and a dressing space with full head room. If possible, space should be provided inside the closed body for a wardrobe trunk and a special dresser. These will be most convenient, saving repeated packing and unpacking of clothing and small articles.

It is not essential, in these two-party cars, to make arrangements for cooking and serving meals. Many will prefer not to bother with such work but will like to sleep in the car and get their meals at restaurants and hotels. Even so, they will be able to cut their living expenses on tour in half by eliminating hotel room charges and still get the benefit of living in the open day and night. Should they desire, however, to do real camping, they can at any time add a complete cooking and dining outfit, compactly arranged in a metal case to be carried on the running board.

As one studies the possibilities of the camping car and trailer in their various forms, they become fairly fascinating and, although the problems are many and difficult, the way has already been explored in a number of directions, the demand exists and is large in potentialities, and American genius is great.

Safety Code for Foundries Approved by Engineering Standards Committee

A DEQUATE provision for the protection of industrial workers in foundries in the iron, steel, tin, zinc, lead, aluminum and other industries is included in the National Safety Code for the Protection of Industrial Workers in Foundries which has just been approved by the American Engineering Standards Committee.

The approved code deals with foundry conditions only, omitting such subjects as building construction, exits, stairways, elevators, lighting, sanitation, etc., as these subjects are covered by other codes which have an official status before the American Engineering Standards Committee. The code consists of 124 sections, which are grouped under the following twelve main divisions: Entrances, floors, pits and galleries, gang-

ways, aisles, foundry equipment, finishing and cleaning, heating, ventilation, operating rules, protection devices, employment of females, and recommendations.

The sectional committee which revised the foundry safety code and recommended it for approval by the A. E. S. C. included representatives of the National Founders' Association, the Association of Government Labor Officials, the United States Department of Labor, the American Foundrymen's Association, the National Association of Mutual Casualty Companies, the National Safety Council, the United States Bureau of Standards, the National Association of Manufacturers, the National Bureau of Casualty and Surety Underwriters, the American Society of Safety Engineers and the United States Public Health Service.

Demand for Motor Vehicles Reviving in Sweden

High tariffs made Swedish industry slump. Signs of increased business now. Adoption of gasoline rail cars being considered by many railway companies. American motorcycles popular. U. S. automotive representation at 1923 Jubilee will aid sales.

By E. C. Petrie

DURING the period of commercial prosperity there was a great demand in Sweden for motor vehicles. This may be grasped from the fact that the value of these imports for the two years 1919-1920 totaled Kr. 90,000,000.

The figures for the last two years were:

Passen. cars	Value	Trucks	Value
1920 ..9422	Kr. 56,649,964	2519	Kr. 14,634,524
1921 ..4637	Kr. 22,143,194	1109	Kr. 5,403,980

The falling off in demand in 1921 is very noticeable. One of the causes of this is owing to the fact that large quantities of American vehicles imported into Denmark, and unsaleable there, were re-exported to Sweden during the year. This was particularly the case with the cheaper types, most of which were absorbed by the farmers of South Sweden. The proceeding was facilitated by the difference in the Danish and Swedish exchanges.

The Tidaholms Bruks Aktiebolag, one of the leading Swedish motor works, was prompted by this and other foreign activities to request the Government to take action to protect the home motor-car industry.

The result of the decline in trade inflicted great hardship on many dealers who, deceived by the artificially prosperous conditions which prevailed in 1919 and the beginning of 1920, saddled themselves with vehicles and a great quantity of accessories. Consequently prices have very much dwindled, and it is not surprising that the Swedish motor vehicle industry, which is more or less in its infancy, has been severely hit by the changed conditions.

In normal times there is little unemployment, and the standard of living is relatively high. The Swede is traditionally independent and will not be satisfied with tawdry goods. It follows that Sweden is normally a market for well-made high-class articles, and when economic stability returns there ought to be good openings in this country for well-constructed cars costing a reasonable sum.

Distances in Sweden are relatively great, and, notwithstanding a well-organized railroad system, it is obvious that services cannot be maintained so frequently as is the case in thickly populated countries. For this reason, the adoption of the gasoline-driven rail car is being considered by many of the railroad companies for use over the shorter lines.

It is essential for motor manufacturers to study local conditions in Sweden closely. Country roads are, on the whole, poor, and except in the south these roads can only

be used during six months of the year for light vehicles. Even in the winter these skid badly on the icy surface after the snow has been beaten down by traffic. It follows, therefore, that, generally speaking, heavy motor transport is mainly confined to the cities and is only employed in the country districts during the dry summer periods.

A law was introduced last August containing provisions governing the width of tires, etc., of commercial motor vehicles. This law, the precursor of further legislation designed to preserve and improve Swedish roads, decrees that no vehicle weighing more than 2500 kilog. shall be permitted on ordinary country roads.

The speed of vehicles with solid tires is limited to 15 km. per hour and the width of vehicles to two meters. The width of tires must be calculated at 1 cm. for every 50 kilog. of weight on the tire up to 8 cm. or 400 kilog.

On the representations of owners of heavy vehicles and tires which would have been rendered obsolete by this decree, the operation of the law was suspended until Oct. 1, 1922, but in the case of vehicles registered before that date the law will not become operative before Oct. 1, 1924.

A bill was introduced last March for the purpose of taxing automobiles and tires, whether imported or manufactured in Sweden. The proceeds, estimated at Kr. 5,000,000, will most probably be granted to the communes for the upkeep of the country roads.

AUTOMOBILE dealers in Sweden are experiencing a brisk revival of business, several of them having sold out nearly their entire stocks and anxiously awaiting deliveries of new lots ordered some time ago, according to a report received from Consul General Murphy, Stockholm, at the Department of Commerce.

A considerable drop in prices, together with a more favorable exchange rate, has allowed American cars to be sold at prices fifty per cent under those of last year, while still leaving a good margin of profit.

One dealer has already sold the greater part of a consignment of cars now en route and another having sold 100 American cars within the last sixty days has placed orders in the United States for an equal number.

The proposed tax on motor cars and motorcycles is to be paid annually to the county government in which the vehicle is registered at the following rates:

Motorcycle without side car.....Kr. 10

Motorcycle with side car.....Kr. 20

Motor car with soft rubber tires for each

100 kilog. of the weight of the car.....Kr. 8

Motor car with other tires for each 100

kilog. of the weight of the car.....Kr. 50

Automobiles are to be liable to taxation as from the calendar quarter next after that in which they were entered for the first time on an automobile register.

The tax on soft rubber tires is to be Kr. 1.50 per kilog. The tax on imported tires is to be paid to the customs together with the duty. If an imported automobile is provided with tires, the tax on the tires is to be paid together with the customs duty on the automobile. The tax on rubber tires manufactured in Sweden is to be levied on the manufacturer by the Government of the county in which the manufacture takes place. For this purpose declarations of deliveries are to be made quarterly by the manufacturer, and the tax is to be paid simultaneously with the declaration. Rubber tires for automobiles are at present manufactured in Sweden by only two firms.

Taxation should come into force on Jan. 1, 1923.

The importation of motorcycles has practically ceased for the time being, owing to the fact that American machines were imported during 1919 and 1920 in large quantities at comparatively low prices until the market was overstocked. Whereas, the average imports from 1912 up to and including 1918 was about 500 per annum, imports in 1919 amounted to 3274 machines, in 1920 to 5975 and in 1921 to about 2500. At the same time the number of motorcycles in use rose from 9059 at the end of 1919 to an estimated number of about 19,000 at the end of 1921.

The reason of the success of the American machine is its comparatively low price in conjunction with a high horsepower which makes it suitable for Swedish roads. Moreover, the average Swedish driver favors a chain drive rather than a belt drive. The latter is apt to slip, especially in cold weather.

As country road surfaces are, generally speaking, extremely bad, lightly built machines are likely to shake to pieces. Some British machines are very suitable, but high

prices have almost excluded them from the market. As a rule, 6 to 8 horsepower is regarded as the most suitable for Swedish roads. Lighter machines are mainly used for town traffic, and for this work the very light class of machine weighing less than 50 kilog. is popular.

The high price of gasoline has driven Sweden to attempt to solve its fuel problem. This is thought to be near solution, and should result in increased automotive sales. Last year 48,936,584 kilog. of fuel oil was imported into the country.

It is estimated that there are 5,000,000,000 tons of oil shale in the country. A plant recently put down at Hidings is now treating 100 tons of shale a day, and it is claimed that the product is capable of competing with all other kinds of fuel. Local peat deposits are also the subject of motor fuel research.

EXPERIMENTS are also being carried out in connection with the production of a new motor fuel. This is an alcoholic preparation made from raw materials produced in the country, and is said to be better and cheaper than benzine. This fuel will be shortly on the market, and much is expected from it.

There are now signs that the demand for automobiles in Sweden is reviving, for a considerable number of vehicles has been imported this spring. American manufacturers are maintaining a firm hold of this market, despite European, mainly German, competition. This is principally attributed to their well-developed selling organizations.

Gothenburg, the best-positioned port and the center of Sweden's economic activity, is the headquarters from whence a marketing campaign should be conducted in this field. Next year a Jubilee Exhibition is to be held to celebrate the tercentenary of the city's foundation. Arrangements are being made for holding a separate exhibition for automotive products, and if this project materializes it will probably include a section for foreign exhibitors. Possibly by that time Sweden will have fully recovered from the setback occasioned by the world-wide slump, and efficient representation at the Jubilee Exhibition should result in a permanent return to the large American sales that were a feature in Sweden during the immediate post-armistice period.

Austrian Market Dull

IN Vienna it is a matter of high finance and involved accounting to purchase an automobile. Prices on the types of cars prevailing on the Austrian market are nonchalantly quoted at prices ranging between 2,000,000 and 2,500,000 crowns, and they vary with the shifting exchange.

Consul Kemp in reporting to the Department of Commerce on the Austrian market for automobiles, which he concedes at present to be rather dull, due to the mountain climbing proclivities of the crown, and the internal condition of the country, says "American designs and engines are well appreciated by Hungarian motor enthusiasts." However, when dealing in millions the spirit of an enthusiast is likely to be dampened. But, continues the report, "some well-known American makes not too prohibitive in price might be sold on the market, although it is now completely controlled by German, Italian and Austrian manufactures."

Official figures give the present number of motor cars and trucks in Hungary as 3,640 of which 2,582 are in use. The Consul advises Americans when approaching

the market to quote prices in dollars to obviate the necessity of employing a certified accountant and to avoid a possible loss in exchange fluctuations.

AFIGHT of marked interest to American motor car manufacturers is now being waged in India as a result of the unusually high tariff that has been imposed on motor vehicles. Motor cars in India are officially taxed as luxuries. The Ford is legally declared to be more luxurious than the most splendid carriage and pair of horses which abound in India. When a motor car is brought into India the customs count up its price, the freight paid for bringing it to the country and the cost of packing and insurance for the voyage and then levy a toll amounting to 30 per cent on the total as duty. For every 3000 rupees that a car costs landed in Bombay the customs take a tax of another thousand rupees.

Motor car dealers and business interests generally in India are making a vigorous effort to induce the Indian Tariff Commission to reduce the duty on motor cars.



The FORUM



Fuel Distillation

Editor, AUTOMOTIVE INDUSTRIES:

I read the article of P. S. Tice concerning fractional distillation with a great deal of interest and believe it to be a very excellent presentation of the subject. I cannot, however, agree with Mr. Tice in one or two minor details. For instance, the matter of identifying the components which go to make up a sample of gasoline is entirely beyond the range of any fractionation method. If we had only to deal with the gasolines of 20 years ago it would be quite possible to do as Mr. Tice suggests, but with gasolines of the present day which contain as high as 12 carbon atom members of various hydrocarbon series, I want to call your attention to isomerism.

There are, at least, over 100 different molecules that can be constructed, each one containing 12 carbon atoms and 26 hydrogen atoms and each one has a different boiling point by a few degrees or fractions thereof. You will readily appreciate, therefore, that going into this sort of a thing by fractionation it is utterly impossible to discriminate between various isomers of the same compound. In addition, present-day gasoline obtained from mid-continent crudes and California crudes contain many other series of hydrocarbons other than paraffins which renders the situation still more complex.

However, aside from this, Mr. Tice's work is to be commended from the viewpoint that a more accurate distillation method than the present one is highly desirable,

particularly for research work. On the other hand, the present type of distillation apparatus which has been adopted by the American Society for Testing Materials as well as the Governmental Committee has the advantage of simplicity and cheapness, and it is expected to extend the use of this test for buying and selling gasolines, naphthas, kerosenes, gas oils, fuel oils, etc. With this diversity of usefulness in mind, I can hardly see the justice of discarding this test because it has a few shortcomings in favor of a more complex method which is adapted only for testing gasolines.

It is my personal opinion that with a few and proper modifications of the distillation method at present adopted as tentative standard, check results within very reasonable limits will not be at all difficult and for all commercial purposes this test will serve satisfactorily. Furthermore, accepting these data as a physical constant of the fuel used and applying to it the recent work of R. E. Wilson and Barnard it will be readily possible to determine therefrom all the desirable characteristics of the fuel that may be obtained by Mr. Tice's method. However, as I said before, I believe Mr. Tice has developed a piece of apparatus with real merit for research work and is quite commendable as such.

THOMAS MIDGLEY, JR.,
Chief Engineer,

Fuel Section, General Motors Research Corporation.

Oil Pumping

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial in the last issue of AUTOMOTIVE INDUSTRIES on oil pumping is timely and should help to emphasize the points brought out by Messrs. Bull and Round in their Summer Meeting papers. One thing that you mention, however, I would like to comment upon, this being the tacit assumption that the amount of oil pumped is proportional to the pressure existing in the cylinder.

Ricardo disagrees entirely with you on this point, stating that the pressure in the cylinder over a range from a considerable plus to a considerable minus had no effect at all. While this is still debatable to a small degree, there is little doubt but that Ricardo is practically correct.

What really happens is that when the engine is pulling hard the oil is mostly burnt up as fast as it reaches the piston head whereas, at low throttle, the lower heat of combustion cannot burn the oil, which consequently accumulates. Of course this means that it is desirable to supply oil to the cylinders in proportion to intake manifold depression just the same, so the final conclusion you reach is unaffected.

The point is not without importance, though, because it explains why an engine which pumps oil badly is often

made worse by using a heavier oil, especially with full pressure systems. Various investigators have found that if any given quantity of oil actually reaches the cylinders the amount pumped is but little affected by the viscosity. Heavy oils are almost always harder to burn than light oils and leave stickier deposits, so that if a certain quantity of oil is going to reach the combustion chamber anyway we should keep it as light as we can, for the cleaner it burns the longer it will be before carbonization begins to be troublesome.

Where a thick oil may sometimes help an oil pumper is by restricting the amount of oil to reach the cylinder. In a pressure system with the release valve untouched about the same bulk of heavy oil will be circulated as of light oil, hence changing the oil will not often do much good, but with a splash system the heavier body or higher viscosity can help somewhat because rather less will be splashed.

Cause and effect are very easily confused when thinking of lubrication, and just which is which is sometimes far from obvious. Even more than that, agreement is not universal by any means.

A. LUDLOW CLAYDEN,
Chief Engineer Gas Engine Research,
The Sun Co.

Motor Trucks to Move Mails if Railway Strike Comes

Post Office Department has 10,000 trucks ready to carry mails. Schedules and routes have been laid out. Only 50 per cent delay in 1st and 2nd class mails expected. Trucks already help in West.

THE railroad strike, if it comes, will not interfere with the transportation of the United States mails—thanks to the automobile industry. At best it can only slow the mails down about 50 per cent.

This is the assertion made by Harry H. Billany, Fourth Assistant Postmaster General, in charge of the automotive equipment, consisting of thousands of trucks, of the United States Post Office Department, and on whose shoulders the task of moving the United States mails will evolve, should the railway strike be called. Detailed plans have been completed by the Government for handling the mails. Thousands of trucks are ready, the Government official said, to a representative of AUTOMOTIVE INDUSTRIES. The Department has made plans for the acquisition of thousands of additional ones to be used the day that railway transportation service is tied up.

For more than two months statisticians of the department have been securing data and charting the United States, laying out tentative routes for automotive transports which will ply between mail terminals on schedule. These schedules have also been tentatively drawn up and the Post Office officials are ready to execute them on a moment's notice.

"Twenty-five, twenty, or possibly ten years ago, the prospects of a nationwide railroad tie-up would have meant a complete tie-up of the United States mails," Billany said.

"To-day, to the best of our judgment, it will mean not more than a 50 per cent delay in first and second class mails. But the big thing that we are interested in and that we shall be able to put over, thanks to the automobile industry, is that the mails will be delivered.

"There will be no stopping the mails. Ten thousand trucks are now standing idle, figuratively speaking, with their engines tuned up, awaiting to see what will be the outcome of the nationwide threatened strike.

"Within an hour after the last passenger train is tied up the trucks will be on the highways, loaded with mail, running on schedule between terminals that can be reached within a day's ride."

Trucks Contracted for by Government

Back of the truck transport fleet which the Post Office Department, in conjunction with the Agricultural and War Department, has mobilized, will be several thousand trucks, the services of which have already been contracted for by the Government.

Postmaster Billany admitted that the contracting of trucks, in anticipation of the strike, was the Government's trump card in the automotive transportation of the mails. Postmasters throughout the United States who are located at points designated as "automotive terminals" have been

instructed, and in most cases have already executed their instructions, to sign up tentatively, of course, the necessary number of trucks to handle the mails from their terminal to the surrounding territory.

They have been assisted in this by the statisticians in the Department, who have compiled data, based on records available in the Department, showing how many trucks, of a designated capacity, will be needed to handle the mails in any given territory.

Mail Routes Already Charted

As an example, the postmaster at St. Louis, Mo., has been furnished with a chart showing how much first and second class mail is moved daily out of his terminal. The routes are to be short enough to permit a truck driver to leave his terminal in the morning, reach his destination at night, and return to his terminal the next morning.

Radiating from St. Louis in all directions, the chart shows just how much territory will be covered and the amount of mail that is normally handled, and the number of trucks that will be required to handle the estimated amount of mail which the officials are capable of determining to a surprising degree of accuracy, inasmuch as all mail is weighed out and into terminals, when shipped over railroads.

WITH the movement of the mails mapped out into territories, there remained the task of allocating the necessary automotive equipment required to handle the mail, and the routing of the best roads. The routing of the best routes has been largely left to the local postmasters who, because of their familiarity with conditions, are best able to map out the routes, which have been submitted to the Post Office Department, altered where necessary to make the tangled ends of the routes connect, and returned to the local postmasters.

The securing of the necessary number of automobiles, while uncertain, has progressed to where the Department believes that a sufficient number have been arranged for. Should additional trucks be needed, the local postmasters in charge of mail terminals will be given the authority to contract for additional ones.

"To date," said Mr. Billany, "the movement of the mails has not been hampered to any great extent, except in some of the Western States, where the roads were no doubt anxious to get an excuse to cease operation because of their heavy expenses. In these instances the Department has put into use several hundred mail trucks, and the success of these is what has led us to an optimistic viewpoint of the pending strike, and on which we base our opinion that the mails will not be slowed down more than 50 per cent."

How to Make Money by Being Honest

Factories which cut piece work rates suffer first when labor scarcity begins. Manufacturers who fail to protect dealers on price cut and new models reap a crop of increased marketing costs and decreased future sales. Fair-dealing in business pays.

By Harry Tipper

ABOUT a year ago, at the golf club of which the writer is a member, the honor system of handicapping was put into use. This system provides a card for each member on which are shown the five lowest scores, with the last score in an additional space, the average score, and the handicap. The handicap list is provided so that there will be no difficulty in arriving at the handicaps, and members are supposed to change these scores every time they improve, and to alter the handicap in accordance therewith. The scores required are exact scores and approximate scores. Most of the members are very faithful in their attendance to this duty, and after a good week-end of golf in the summer time, they can be found around the handicap board rearranging their own handicaps.

There are a few members, however, who do not play very much except in competitions, who make no changes in their handicap week in and week out until a competition forces a change. Of course, this is not of any particular importance, yet it is a source of a great deal of gossip in the locker room, and a never ending nuisance to the golf committee, who are trying to keep things straight. It has a tendency to ruin the co-operative spirit of the club, because it is one of those little advantages that may be taken of the other fellow without any apparent infraction of the rules. The moral obligation is evidently not understood by those who transgress in this direction.

Something of the same sort happens in business. Here and there in the industry one concern or another will take advantage of this or that situation in a way which destroys to some extent the confidence of the organization, increases the general suspicion, and affects the market—whether it is the market for labor, raw materials, or finished products.

Since the depression began, there has been a retrogression to the practice of cutting piece work rates, for instance, in manufacturing establishments where the prevailing rates offer the worker an opportunity to make money too freely, in the opinion of the management. Of course, there is no real and open piece rate price cutting going on to-day, but there are some factories in business where it is understood that a man had better not make more than a certain amount of money unless he wants his rate cut. Most of these cuts are executed through new time studies, and they are executed because there is a desire to take advantage of the situation for the benefit of the concern. The plentiful supply of labor which was obtainable a few months ago, led to an increase in this practice, which had almost disappeared, and it is still being continued in some factories.

Operators who are unwilling to carry a piece work price for a reasonable length of time after the price has been made, not only are unjust to themselves and the workers, but they are making it difficult to secure the desired results in the way of production economy.

The worker is intelligent enough to know when his piece prices are unsafe, and to imagine the reason in spite of the supposed reasons which may be given to him.

In any case, a piece price which cannot be sustained for a reasonable length of time—say six months or a year—indicates either one of two things:

1. Poor time and motion study analysis in the beginning.
2. The use of the piece work rate as a substitute for day wages without regard to the piece work necessities.

Temporarily, of course, the worker will abide by such decisions as are made by the manufacturer because of the necessity for a safe job. But the seeds of unrest have been sown wherever this practice obtains, and no co-operation can be expected by the manufacturer in the development of more efficient production or in the maintenance of a low turnover as the demand for workers increases.

IF a mistake has been made in the time and motion study, the mistake is clearly up to the manufacturer. This organization for this purpose should be sufficiently experienced, possessed of sufficient records, and capable of developing a wise time per piece which will permit of reasonable profit on the production cost. If the time per piece has been set so that a reasonable production quantity can be secured for the price, the additional earnings provided by the voluntary increase in pace on the part of the worker, net an additional profit to the manufacturer because they reduce the proportion of overhead going to the individual unit of production. In fact, all the charges other than the direct charges entering into this production are reduced in a definite proportion. Nothing is more irritating to the worker than the constant rearrangement of the piece work rate, and nothing destroys the morale of the supervisors and the executive staff in a factory so thoroughly as the necessity of conducting business along these lines.

The manufacturer has a moral obligation to deal decently with these workers and it is an economic blunder not to do so. It is fundamentally impossible to secure the greatest production value out of the unit of skilled labor unless the skilled worker is convinced that the management of the factory will deal squarely by him in his operations.

The service of the worker is no less when he voluntarily increases his pace so that his earnings are greatly increased. The price per piece is not increased because the piece work rate has taken care of that.

The actual total cost per unit of production is actually decreased, because the fixed charges and other overhead are spread over a greater number of pieces, and there is no reason for altering the piece rate within the time through which costs have been operated, and the net result is to destroy the possibility of maximum production pace, the most important element in reducing the production cost.

A somewhat similar situation is to be observed in the methods adopted by some of the manufacturers in dealing with their customers—the retailers. A number of cases have come up where retailers were not advised of changes in prices until a few days before the change was effected, although they possessed a considerable stock of the products bought on the old basis. Similarly, immediate and arbitrary action has been taken by the manufacturer in several instances, cancelling the contract with an agency for reasons which have not previously obtained, and in respect to which the retailer has had no warning.

Again, it is not only the question of the moral obligation imposed upon every manufacturer to deal squarely with his customers, but it is an economic blunder to throw a doubt and suspicion into the whole business of distributing the automobile, which is of the utmost importance. Business hesitation, limited by lack of sales activity, and other elements that spell poor business, and difficult times, arises mainly out of doubt and suspicion as to the outcome of the ordinary methods of doing business.

A dealer who has been caught with a stock on hand when the price was to be lower will buy hand-to-mouth for a very long period from the concern guilty of the practice. The dealer who has had a contract cancelled on him with practically no warning will hesitate to put himself completely into the hands of another manufacturing concern, and so the channels of distribution become clogged because it is not to the interest of the dealer to keep them clean and free.

There are other practices obtaining in the buying of materials which bear the same import in their effect upon

the industry. If a company had no future obligations in capital, credit, etc., and had no desire to maintain a future organization, more effective than the present one, such practices would at least be executed on a basis where they would not reflect adversely upon the future of the business. Manufacturing concerns of large size and importance are sufficiently obligated by capital and credit obligations, in future commitments and necessities for the future business to be more important than the present business. That future business must extend itself 10, 15 or 20 years at least in order to permit the company to successfully meet all of the obligations arising out of its activity.

THE things which are happening to-day will not have any effect upon the manufacturing position at the moment, but the organization that has been cutting the piece work rates will be the first organization to suffer when labor gets scarce or when there are labor difficulties, and such an organization will find itself gradually in a less advantageous competitive position because of the added difficulty of making production economies in the face of the suspicion and the dissatisfaction of labor and turnover.

The same thing is true in the field of distribution. The retail field of the automotive business requires above all time to stabilize itself. It has been growing too fast and too far to have acquired the right kind of stability.

This stability must come of necessity from the increased understanding between the manufacturer and the retailer, and an increased confidence regarding the business between the two.

Consequently, all measures that suggest a doubt, create a suspicion, or question the integrity on either side, should be strictly eliminated because they are economically unsound and do not permit the stabilizing of the business along the right lines.

As the future obligation of business grows larger, the coincidence between the future obligation and the proper recognition of the moral obligation becomes closer and more apparent. This fact is one of the important facts of management which should be considered in the councils of all concerns doing business with large numbers of workers, large numbers of retailers, and millions of users.

Reports on Aeronautic Subjects

THE National Advisory Committee for Aeronautics has recently published a number of reports of interest to engineers and others in the aircraft industry. The most recent of these is the concluding one of a series dealing with aircraft instruments, especially those used for the purpose of navigation. Among the outstanding problems mentioned in this report are the need for navigating instruments suitable for long distance flights and for flying at night and landing in the fog, improvement of oxygen instruments for high altitude flying and the attainment of greater reliability and precision in all aeronautic instruments. This report bears the title "Recent Developments and Outstanding Problems." Other reports dealing with aircraft instruments are entitled "Aerial Navigation and Navigating Instruments," and "Aircraft Speed Instruments."

Reports dealing with various phases of aerodynamics include one on the "General Theory of Wing Sections." It outlines a simple method calculating the air forces to which wings are subjected at small angles of attack if their curvature is not too great and includes calculations of the elevator effect, general formula for any section, examples

of zero angle, moment coefficient, etc.

Another report takes up the subject of "Lift and Drag Effects of Wing-Tip Rake" and describes tests carried out at the Washington Navy Yard on models of the R.A.F.-6, Albatross and Sloan aerofoils to determine the effectiveness of the conventional wing tip rake in improving aerofoil characteristics. Two degrees of rake were tested on each model, the trailing edge being always longer than the leading edge. The results are compared with values computed by standard formulæ.

"The Tail Plane" is the title of still another report which deals with calculations pertaining to this part. The author endeavors to simplify the present theory of longitudinal stability and to obtain one definite coefficient characteristic of the effect of the tail plane. It appears that the designer should avoid certain critical lengths of fuselage which give rise to periodic oscillations of the airplane. Suggestions as to the method and direction in which to carry out experimental work are included.

Copies of the various reports are obtainable from the National Advisory Committee for Aeronautics, Washington, upon request.

AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

Reg. U. S. Pat. Off.

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Cheap Closed Cars Stabilize Industry

THE new body models so far announced this fall do not include any marked contributions to the cheap utility closed car movement. Last fall several closed jobs of this kind were announced for the first time. They caused considerable comment, because they seemed a step toward fulfilling a large latent demand on the part of the buying public.

The presence of this demand is clearly shown by the increased percentage of closed cars built each year since 1915. A survey made some months ago by AUTOMOTIVE INDUSTRIES showed that the percentage of total production comprised of closed cars mounted between 1915 and 1921 as follows:

1915	.....	.015
1916	.....	.015
1917	.....	.04
1918	.....	.07
1919	.....	.10

1920	.....	.18
1921	.....	.25

Doubtless the cheap closed jobs introduced toward the end of last year will help make another increase in the 1922 proportion of closed cars. There is still much to be accomplished in connection with the design and manufacture of such models. A beginning has already been made, and it is to be hoped that no year will pass for sometime without some new models recording progress along this line.

The advantage to the manufacturer through the development of such jobs is twofold. Satisfactory, cheap closed cars will help increase sales because they open a certain latent field for sales and thus widen the market. Moreover, they tend to increase fall and winter buying and thus stabilize the quantity of sales and production throughout the year.

Smaller Wheel and Tire Diameters

MUCH comment is to be heard in trade and engineering circles concerning the new plans of tire companies looking to the marketing of several sizes of tires designed for use on 20-in. wheels. The Rubber Association and the Tire and Rim Association have definitely created standards for 20-in. wheels intended to accommodate 5, 6, 7 and 8-in. tires and some companies are now furnishing sample sets of these tires to truck manufacturers.

The former standard wheels were 24 in. diameter, and this size will, of course, be continued. The 20-in. rim has the advantage of lowering the center of gravity of a vehicle 2 in., a highly desirable accomplishment for certain classes of chassis, especially those intended for bus service. There is less material in the new series of tires than in tires of the same section made up for the larger rim, consequently they may be expected to sell at a lower price but have a correspondingly shorter life.

Just what effect this will have upon the market is problematical. Some foresee a greatly increased market for pneumatic truck tires, especially if changed conditions in respect to traffic regulation permit the use of higher speeds than are now generally permitted. First cost and cost per mile will, others think, have to be more nearly on a parity with that of the solid tire before any greatly extended use of pneumatics on heavy trucks is apt to take place.

The chief disadvantage of the 20-in. wheel from the point of view of the truck designer is the difficulty of fitting to it a brake drum of adequate size. Some truck engineers have criticized the tire industry for standardizing the new wheel size without first consulting the truck industry as to the effect on truck design involved. Possibly in some cases the brake drum problem can be solved by fitting propeller shaft brakes of larger dimensions. Smaller wheels and tires mean more revolutions per mile of the wheel and consequently a higher drum speed for drum of given size. Consequently, unless the drum size must be decreased more in proportion than the tire diameter, the difficulty may be more apparent than real.

Highways Sell Motor Vehicles

THE influence of highways on future car and truck sales is being recognized more fully every day by automotive executives. The saturation point for motor vehicles is the saturation point of transportation, and the scope and character of highways is a determining factor in the latter.

A country without any highways offers no market for motor vehicles. A city with narrow streets offers a smaller market than a city with broad boulevards. A territory with roads connecting important centers offers a better market for cars and trucks than one in which such ease of transportation is lacking.

The tremendous number of motor vehicles in certain areas is bringing constantly increasing traffic problems. If these problems are successfully solved, still more vehicles can be sold and used without difficulty. If they are not solved, the saturation point for vehicles will be just that much closer in these areas.

The future life of the automotive industry depends upon a proper solution of all of the problems relating to highways and highways transport. These, include highway finance, construction, transportation costs, education, safety and other problems of similar character.

Transportation studies, designed to find out the actual cost of motor haulage and its present and probable density, have already been conducted in Connecticut, Maryland and several other states. These preliminary investigations indicate clearly the line along which constructive work should proceed in the future.

The Bureau of Public Roads, together with various prominent state highway commissioners has been giving special thought to the matter of highway finance within the last few months. The N. A. C. C. Highway Committee has taken an active part in the work that is being done along this line. Further meetings to deal with finance are to be held in the near future.

The active cooperation of every executive in the industry is necessary if the best action is to be taken in handling each of these matters. The intensive activity of a small committee representing the manufacturers is already having a highly beneficial effect, but more widespread interest is essential to the attainment of maximum results.

July Made New Mark in Output Records

Total Production, Estimated at
246,000, Exceeded by Only
Two Previous Months

NEW YORK, Aug. 15—The automobile industry has set another production record. Passenger cars and trucks produced in July numbered approximately 246,000 which is the largest July business and also the largest month in the history of the industry, the record month having been June, 1922, with 288,000 and the second, May with 256,000.

The July record brings total production for the year up to 1,403,000 and indicates that 1922 will be the industry's greatest year unless the railroad and coal strike situations, with their effect on supplies of raw materials and general business, exert a serious curtailing influence on manufacturing for the rest of the year.

August Will Show Decline

August production is bound to fall below the July record because of the natural midsummer decline in demand, and it may be still further affected by the coal scarcity which is rapidly approaching a crisis in the Detroit district. So far fuel shortage has not curtailed manufacturing but supplies on hand are being rapidly depleted and prospects are not bright for replenishment unless there is a sudden turn in the Detroit situation. Ford, for instance, is down to a two weeks' supply but is going ahead on full production pending possible relief. If coal is not made available, Ford and many other large plants will be forced to curtail production within the limitations of restricted power facilities available from Detroit public utilities.

No Excitement Over Prices

Outside the strike situation the industry is going forward with confidence of a brisk business throughout the remainder of the year, as indicated by the absence of excitement over price reductions in the highly competitive field, ranging principally between \$500 and \$1,500. It is significant that reductions have been confined almost exclusively to cars in the big production class, none at all having been made by manufacturers producing cars ranging from \$2,000 up. Reductions have been made by manufacturers whose quantity production has enabled them to pass the benefits of manufacturing economies

(Continued on page 341)

Business in Brief

Strikes continue to have a depressing effect upon industrial activities, particularly noticeable in iron, steel and some building materials. Iron and steel prices are going up, and in some cities premiums are being paid for building materials.

These strike conditions also have influenced general trade, despite the optimistic crop outlook, tending to hold down free fall buying, the advance of the fall season and the stimulus of market weeks, buyers' excursions and other aids to business activities.

In a retail way sales and building expenditures are below June, but above July, 1921.

Record crops of hay, potatoes and corn seem certain, and in nearly every other instance the other crops should be larger than last year's. In the way of prices, cereals are the lowest since last winter. Prices have eased, with farm produce leading.

As showing the effect of the scarcity of fuel, it is reported that at least 16 per cent of the furnaces in blast July 1 are idle now. Steel works are slowing down, although using much scrap in place of pig iron.

Railroads are buying freely, July being the most active month of the year, orders having been placed for 353 locomotives, 15,675 freight cars and 120 passenger cars. The railroads report 3,300,000 cars loaded in July as against the 3,451,000 in June, with the July car movement 300,000 cars, or 10 per cent of a year ago. In June the movement was 11 per cent ahead of 1921.

Bank clearings showed a loss of 13.9 per cent from last week, but a gain of 9.6 per cent over this week last year, the total being \$6,088,912,000. New York shows a rise of 9.2 per cent over last year. Chicago gains 8.8. Thirty-two cities report gains, while ten are on the other side of the ledger.

Cleveland Tractor Takes Title to 38-Acre Tract

CLEVELAND, Aug. 14.—The Cleveland Tractor Co. has taken title from the Cleveland Trust Co. to the 38 acre tract which it occupies on Euclid Avenue.

At the same time the tractor company gave to the same bank, as trustee, a mortgage deed of trust for \$2,000,000, securing an issue of \$700,000 prior lien 6 per cent mortgage bonds and \$1,300,000 subsequent lien 6 per cent bonds dated July 15, 1922, and maturing in two years. The bank took title to this tract several years ago for Rollin H. White when he first began experimenting with the caterpillar form of tractor.

Edison Able to Meet Daily Needs for Coal

Industry Will Continue to Be
Supplied Until Priorities
Ruling Is Effective

DETROIT, Aug. 16—The coal situation is no better or worse in Detroit than it has been for three weeks past.

The Detroit Edison Co. reports that it is about breaking even at this time, receiving daily shipments in about the quantity required for daily needs.

The resumption of work in many of the soft coal districts as a result of the Cleveland agreement is expected to end any difficulty in supply. The rub remaining, however, is of getting it shipped.

Industry Classed As Non-Essential

The priorities ruling of the Interstate Commerce Commission which would deny power to non-essential industries under which the automotive industry has been classed in Washington has not been effective here for the reason that no coal is being received through the agency of priorities yet.

Though priority applications have been filed most companies here are hustling for their own coal and any they are getting is through their own efforts.

Until such time as companies are unable to get coal except under the priority ruling the automotive industry will continue to be supplied, together with public requirements of all sorts. The Edison Company will make no discrimination and there is a possibility that conditions will not get any worse than they are now. This will mean that power users will be supplied in all their requirements unless action is taken by Congress to put teeth into the power of the coal administration.

Roads Will Make Deliveries

It is not expected that the priorities ruling will be generally effective. The attitude of the Louisville & Nashville Railroad that it will be held responsible under contracts it has made to supply coal is the attitude of all roads and unless the coal administration takes over the responsibility for such claims, the railroads generally will contest its powers.

The possibility of employing truck trains to bring coal into the city has not been seriously considered owing to the inaccessibility of most of the coal fields to truck travel in a vital emergency. It might be possible to bring in some coal to the city from districts not too far removed, but this would be only a measure of last resort. Getting empty coal cars to the mines is the big difficulty of the moment. Once the coal is in the cars most of the difficulty is over.

Executives in the industry are incensed over the action of the coal administration in placing the automobile as a non-essential. Without the activity in the automotive business of the year to date

(Continued on page 346)

1923 Plans Provide for Greater Output

Companies to Expand Factory Room, Chiefly for Closed Car Production

DETROIT, Aug. 16—Despite the exigencies of the coal and rail strikes, the industry is proceeding unhesitatingly with its plans for expansion and increased production in 1923. The central thought in the general expansion program is to provide more room for the production of closed cars, though in some cases the expansion is to provide for increased output in all models.

In this expansion body and car makers are both participating, the former, however, on far the larger scale. By the spring of 1923 body manufacturers should be equipped with ample space to meet whatever demand for closed cars develops, and indications are at this time that the demand will run from 50 to 60 per cent of all cars produced. Demand in the cities, it is predicted, will run from 60 to 75 per cent for closed vehicles.

A noteworthy feature of the closed car demand is that it has resulted in a general extension of business to body builders in all parts of the country. Hitherto the body business has been limited to a smaller number of builders—almost concentrated in a few hands. This condition has given way to a widely diffused buying, making for more individuality and variety in coach work and equipment.

Bodies are now coming into Detroit from all sections. Despite the scattering of production into many hands, and the addition of freight rates which must be borne, closed car prices are lower now than ever before. This is due to improved manufacturing methods and the development of new types which permit of a reduction in operations. Increased demand has permitted car factories to adopt better handling methods. More space in the car factories will result in closed car production on any scale required.

Arrow Motors to Change Its Name to "Courier"

TOLEDO, Aug. 14—The Arrow Motors Co. of Sandusky, which was incorporated to take over the assets of the defunct Maibohm Motors Co., will soon amend its articles of incorporation so as to change the name of the company to Courier Motors Co.

The company will manufacture a car to sell in the \$1,000 class.

M. A. M. A. TO MOVE

NEW YORK, Aug. 14—The Motor & Accessories Manufacturers Association will move its headquarters on Oct. 1, having leased office room on the twentieth floors of the Fisk Building, Broadway and 57th Street. The association will have 50 per cent more space than

Foreign Markets Should Absorb Surplus of American Farm Products

By J. G. BAYERLINE,

President of the Columbia Motor Car Co.

Detroit, Aug. 15.

IF the United States is to be really prosperous in the next few years it is important that foreign markets be opened for the surplus crops that the farmers are capable of raising. Unless such markets are opened farmers will be limited in the amount of money their crops can be made to yield and consequently will be limited in their buying power.

Bumper crops are assured at this time, far more than the needs of the domestic market. I am told that bankers in Kansas are depressed over the prospect of finding sufficient markets abroad to take the surplus yield. Consultations are in progress now with New York bankers which are expected to determine the policy of the western bankers in dealing with the farmers.

The money owed to the United States by European countries bears an important relation to market for American products abroad. Several of America's most prominent financiers have advocated the cancellation of these debts as a means of stabilizing world conditions and reopening the markets to American exports. If this cancellation would restore the markets, it seems the logical thing to do.

If crop marketing is successful there is every reason to expect that there will be a large sale to farmers of medium priced automobiles. The progress in farmers' affairs finds many of them in improving their methods of life to be going in for better automobiles than the ones they first bought. The sale of a better automobile to any farmer opens the way to sales to all his neighbors.

With automobiles the farmer is not confined to his farm but is able to come into the city or town at frequent intervals. Coming to the city means more buying and buying of better goods. The farmer to-day is better dressed, and more discriminating generally than he was before the automobile enabled him to get in and out of the city frequently. Consequently every sale of an automobile to a farmer means the opening of opportunities for a much larger flow of business than would otherwise have been possible.

Competition for business in the lower priced automobile field caused by the entrance of new manufacturers will make owners of many people who have never owned automobiles and will be a stimulus to the industry all along the line. The more persons who become accustomed to the use and utility of automobiles, the more business there will be in higher priced cars later on due to natural progression.

it at present occupies in Aeolian Hall, 33 West 42nd Street, where it has been located for the past 10 years. In making the move, General Manager M. L. Hem-inway was influenced to a certain extent by the fact that the Rubber association and other organizations with which the M. A. M. A. is in close contact are in the Fisk Building.

AUTO-LITE BRANCH FACTORY

TOLEDO, Aug. 14—The Electric Auto-Lite Co. has opened up a branch factory for the production of armatures for electric generators at Adrian, Mich., in the building formerly occupied by the Willys-Overland automobile agency. The present quarters have been leased for a year, with option of purchase.

It is expected that 75 to 100 persons will be employed.

ROLLS-ROYCE ON NIGHT SHIFT

SPRINGFIELD, MASS., Aug. 15—Rolls-Royce of America, Inc., will operate a night shift of 100 men in two departments. This change, necessitated by the fact that deliveries are considerably behind sales, will become effective as soon as necessary organization changes can be made. With this departure the weekly output of cars will be increased.

Chevrolet Works on Plan for Michigan Frontenac

INDIANAPOLIS, Aug. 14—The fact that the Delaware corporation of the Frontenac Motor Co. of America, Inc., has been dissolved will have no effect on the work being done in promotion of the original Frontenac Motor Co. incorporated in Michigan in 1915 and still in existence, Louis Chevrolet, vice-president of the Delaware corporation says.

He stated that the dissolution was merely a step in the adjustment of the affairs of Allan A. Ryan. Frontenac of Delaware together with Ryan interests intended ultimately to take over the Michigan corporation.

Chevrolet states that he and his associates are working on a plan by which he hopes that the Frontenac Motor Co. of Michigan may be revived and become a producer.

WILLYS CASHIER DIES

TOLEDO, Aug. 14—Frank B. Jacobs, cashier of the Willys-Overland Co., died at Mercy Hospital following an operation for appendicitis. Jacobs had been employed in the Second National Bank before entering the automotive field with the Overland.

No Change Planned in Stutz Personnel

Program of Expansion Assured
Following Schwab's Visit
to Factory

INDIANAPOLIS, IND., Aug. 15—Charles M. Schwab, president of the Bethlehem Steel Corp., who obtained control of Stutz Motor Car Co. of America a few days ago, has announced that he will be actively interested in the Stutz management, but that the personnel of the Stutz organization will not be changed. A program of enlargement and expansion is said to be assured.

Prices Reduced

Coincident with the visit of Schwab and his announcement regarding the organization of the factory forces, a revised schedule of prices for Stutz cars also was made known with price reductions ranging from \$200 to \$500. The roadster is now \$2,450, a \$500 reduction; four passenger phaeton \$2,790, a \$200 reduction; the six passenger phaeton is \$2,640, a drop of \$350, while the coupe, now \$3,490, represents a drop of \$500. The price reductions carry with them full protection for all dealers on all models they now have on hand.

William N. Thompson, president and general manager, will be continued, said Schwab, as will the entire factory organization. Schwab said that the men who have guided the company through the recent uncertainty of the motor car industry are best qualified to handle the new control. "I am in entire sympathy with Mr. Thompson and his associates and have complete confidence in them," he said. "It is farthest from my thoughts to change the personnel. I hope the relations will be as happy as in all the industries and corporations with which I am associated."

Schwab's Statement

In his statement Schwab said:

It is not as if my associates and myself were acquiring a new property in the automotive field, and making our debut in the motor car industry by acquiring control of the Stutz. We have long been interested in the company in a substantial way. What is more natural than that under the circumstances we should desire to control the property as we do in the case of all the other properties with which we are identified?

Our plans for the Stutz simply embrace a continuation of the business on a basis that will permit it to proceed as it deserves to progress—to make the most of the possibilities which lie within its range of ability. We regard the Stutz as a valuable property—one that has potential possibilities that recommend it as deserving of the best thought and effort that can be put forward in its behalf. We are going to develop the Stutz along sound, substantial lines. We intend to make it attractive to the trade.

Although the Stutz company has never been embarrassed so far as its finances are concerned, and at present is in one of the healthiest conditions of any company in the

PENNSYLVANIA WANTS POWERFUL RAIL CARS

PHILADELPHIA, Aug. 14—The Pennsylvania Railroad has announced that it is in the market for about twenty gasoline-driven cars that can be used on its branch lines, especially those on which the traffic is comparatively light.

Recent demonstrations of gasoline power cars of the bus type were regarded as satisfactory, but the motive power department desires something different—a car with power enough to draw a trailer when necessary.

The company, it is said, plans to install a gasoline car on its Bustleton branch. A shuttle train now is running between Holmesburg Junction, on the New York division, and Bustleton. Two cars are needed for this work. The Cresheim branch is another where gasoline power cars could be used to advantage.

business, in order to enable it to go forward at once with the development that we have planned for it, substantial finances have been provided which will be placed at the disposal of its executives to carry on their work.

Though I have been associated in my career with some motor car enterprises from a different angle, this is the first time that I have applied myself actively to the management of a company. I have been here many times and have studied the Stutz. I know the men who are with the Stutz. I have been in a position to watch them proceed. I have the sincerest admiration of their work, and I am convinced that if these Indianapolis men cannot put the Stutz where it belongs, there is not a group of men in the country who can do it.

Mr. Thompson will continue in full control of the policies of the company and will have the entire support of my associates and myself in all that he does, just as every other man entrusted with the development of the company will have our cooperation in every possible way.

Brill Is Now Operating at 65 Per Cent Capacity

PHILADELPHIA, Aug. 14—The J. G. Brill Co., this city, is now operating at 65 per cent of capacity, with 1700 employees, as against 45 per cent of capacity two months ago. An order for one hundred cars has been booked from Detroit and the company also is working on a large volume of orders from various street railway companies.

The company now is constructing 26 gasoline power cars, similar to the type recently tried out by the Pennsylvania Railroad Co., here. They will be of the same power as that car.

Some of the lines these cars are built for are the Maine Central, Cambria & Indiana, Fonda, Johnstown & Gloversville, Great Northern, Central National, Frisco, Seaboard Air Line, Western Pacific, Chicago & Great Western and Tennessee, Alabama & Georgia.

Former Saxon Plant Leased by Columbia

With This Addition Company
Will Have Capacity of 300
Cars Daily

DETROIT, Aug. 15—Columbia Motor Car Co. has leased the plant formerly occupied by Saxon Motor Car Co. in this city and will begin using it in the manufacture of its light six and de luxe model Columbias by Sept. 1. With the addition the company will have capacity for 300 cars daily and expects to step up its production gradually to this figure, reaching 200 daily soon after the first of the year.

The additional plant was taken over almost fully equipped for car assembly purposes, having two assembly tracks and other essentials. In the beginning it is planned to move several of the company's departments into the added buildings, and to use it largely for the building of the larger Columbia models. In taking it over, the company said it was not planned to perform any operations now being contracted for.

Demand for Columbia models was reported to be very brisk in practically all sections of the country, and reports from dealers in the farm district were to the effect that farmers would be large buyers in the medium-priced car field. Only one condition beclouds the generally bright outlook, the prospect of a failure of demand from foreign countries for the surplus crops.

Barber Sees No Let Up in Present Car Demand

TOLEDO, Aug. 14—"Every indication points to a continuance of the present heavy demand for cars," declared A. C. Barber, general sales manager of the Willys-Overland Co., returning from a trip through New England and North Atlantic States.

He says:

We are convinced that there will be no slackening off in demand for cars, particularly if the present industrial unrest is smoothed out, as we are all hopeful that it will be.

The present rush of orders will be maintained at almost an even level for some time to come. Settlement of the strikes and return of the farmer will make this an assured fact.

Barber reported that closed models are in big demand and that rural dealers are reporting farmers as a big factor in local buying.

EMPLOYMENT LESS

DETROIT, Aug. 14—A slight decrease in employment during the week is reported by the members of the Employers Association. The total of 181,733 is 686 less than a week ago. At that time there was a decline of 1075 from the week preceding.

Duesenberg to Add New Line of Bodies

Plans Addition to Plant to Provide for Increased Car Production

INDIANAPOLIS, Aug. 14—The Duesenberg Automobile & Motor Co. of this city will break ground at once for the erection of an additional building which will be used as an assembly plant as well as for the fitting-up and finishing of cars. The announcement made by General Manager Chester Ricker also stated that Duesenberg will shortly add a line of Fleetwood bodies to be ready for fall delivery.

No price announcements have yet been made regarding cars with Fleetwood bodies, but it was definitely stated that there would be no decrease in Duesenberg prices now or in the near future. It is intimated that price raises might be necessitated because of refinements and added quality of finish, details and appointments. At present almost all equipment usually supplied as extras to cars in the higher priced field are furnished in the standard Duesenbergs.

Increased production is what is being sought in the additional building and the desire to carry on all processes of manufacture and finish in the company's plant. Some work has been done in outside buildings recently, but the new addition will remove this necessity. Since the first of July the production figures of the plant have been greatly increased, the plant being able to turn out 45 per cent as many cars as it had in the entire previous part of the year. This was brought about by reorganizations and by more efficient methods put into operation. The pace set in July is being kept up.

Variety of Body Styles

The Fleetwood line when offered will have a variety of body styles in both open and closed jobs. There will be five and seven passenger phaetons and roadsters, as well as town brougham, sedan, inside drive cabriolet with Fleetwood bodies. When the new building is ready about the first of the year it is hoped that production can be raised to four cars a day, these to include both standard models and the Fleetwood line. Factory officials insist that while production has been increased by rearrangements and better methods, the Duesenberg policy of building what are to all intents and purposes custom jobs will be continued with every car turned out by the plant.

NEW ROTARY ENGINE

BUFFALO, Aug. 14—A new rotary engine soon will be manufactured in Buffalo, according to an announcement by L. F. Donnelly, an official of Champion Rotary Motors, a new \$6,000,000 organization. Donnelly said several plant sites

SHORT LINE IN SOUTH WILL USE RAIL CARS

CHATTANOOGA, TENN., Aug. 15—The management of the Tennessee, Alabama and Georgia Railroad has announced that it will use gasoline propelled cars upon its system. The first cars will probably make their trips about Sept. 1.

This is one of the first roads in the South to use gasoline propelled equipment, and the experiment will be watched with interest by the officials of other short line roads.

are under consideration. The company's production for a time will be limited to the manufacture of the engine, details of which have not yet been made public. The other incorporators, besides Donnelly, are D. J. O'Neil and L. F. Lindal.

Donnelly said the new company would be operated in connection with the Augustine Automatic Rotary Engine Co., but added that none of the Augustine officials is a member of the Champion organization.

Buick Special Delivery Cars for 1923 Changed

FLINT, MICH., Aug. 14—The 1923 Buick line of special delivery cars will consist of six body types on the chassis used for the four cylinder Buick models. Mechanical changes have been made.

Crowned fenders have been added together with drum type headlights, a redesigned radiator, which sets much higher, rubber bumpers on the rear axle, special anti-rattle hood catches, silent over-running generator clutch and a new glass switch face. A transmission speedometer drive, a lengthened gearshift and a transmission lock have also been included in the new models.

Felts have been placed around the valve stems to carry oil to the stems and guides, and a new system of generator brushes and brush arms has been used to prevent squeaks. The clutch has been refined, and the clutch hub changed from malleable iron to drop forged steel. The size of the strut and truss rods has been increased. Brakes have been improved.

The new prices range from \$840 to \$935, varying with the type of body and equipment.

MARMON CHANGES PHAETON

INDIANAPOLIS, Aug. 14—A new seven-passenger phaeton is now being produced by the Nordyke & Marmon Co. The hood has been lowered slightly, the body lines from front to rear have been straightened, the length of the body has been increased by an inch and the overall height has been reduced by four inches. The "panorama" top is of the stationary type and is featured by the absence of bows. The price is \$3,185.

Merger Heads Visit Company's Factories

Associated Motors Head Says Kentucky Wagon Will Bear Heavy Burden

LOUISVILLE, KY., Aug. 14—Every square foot of the fifty acres of the Kentucky Wagon Manufacturing Co., one of the outstanding units of Associated Motor Industries, the new \$80,000,000 automobile merger, soon will be alive with activity, Will I. Ohmer of Dayton, Ohio, chairman of the board of directors, said on the occasion of his visit here.

Ohmer is in Louisville with Louis Ruthenburg, former resident of this city and president of Associated Motors, to inspect the wagon plant with a view to forming plans for production and co-ordination with the eight other constituents of the corporation.

The Kentucky Wagon company will carry a large share of the burden of the corporation, according to Ohmer, making truck bodies as well as wheels for cars and trucks produced by the corporation.

The wagon manufacturing company began making the Dixie Flyer automobile seven years ago, in addition to the Old Hickory truck. The automobile production rapidly assumed great importance, it was pointed out, but wagon making has never been discontinued in the wagon division of the plant. This year's program, which probably will be under way by winter, calls for a larger production of wagons, Ohmer says.

R. V. Board will continue as president of the Kentucky Wagon Manufacturing Co., as well as serve as vice-president of Associated Motor Industries. James R. Duffin, president of the Inter-Southern Life Insurance Co., is a director.

Call at National Plant

INDIANAPOLIS, Aug. 12—Will H. Ohmer, chairman of the board of directors, and Louis Ruthenburg, president of the Associated Motor Industries, visited the plant of the National Motor Car & Vehicle Corp. with George Dickson, president of the company and vice-president of Associated Motors, which recently absorbed the company.

NEW STANDARD BUS

DETROIT, Aug. 14—The Standard Motor Truck Co. has brought out a new ten-passenger bus, the general body construction of which is similar to that of the British char-a-bancs. The regular Standard Model 75 truck chassis will be used for this bus job. The price is \$2,500.

TEMPLAR ADDS COUPE

CLEVELAND, Aug. 14—A new four-passenger coupe has just been added to the Templar line. The standard 118 in. wheelbase chassis is used. The price is \$2,650.

Packard Car Finds Good Market Abroad

Export Department Reports Its Allotment Is Oversold Three Months

DETROIT, Aug. 15—Packard Motor Car Co. has oversold its allotment of single and twin six passenger cars for export three months. Announcement of a big increase in export business by the factory was to the effect that the export department could have used four times as many cars as were allotted to it.

Heaviest demand for Packards comes from Australia with Cuba a close second. The fact that it takes from 10 to 12 weeks for the delivery of a car, because of the cross country and long ocean shipment, seems in no way to deter Australian people, Alvan Macauley, president of Packard, said: "The single six apparently has an especially big appeal in Australia," he continued.

French Demand Heavy

Packard recently appointed a new representative in France and the first shipment to that country since a period some time previous to the war was made. French demand has been heavy, it was announced, although an almost prohibitive duty on foreign built cars makes the cost to the purchaser almost double that for which the same car sells in the United States.

Several shipments of both single six and twin six cars have been made to Switzerland, a new territory for Packard sales. The distributor in Switzerland also has included in his territory the southern part of Germany where, he recently informed the factory, there are bright prospects for business, despite the more or less unfavorable general financial outlook.

Catering to Foreign Buyer

In commenting on the increase in foreign business, Macauley said:

The American manufacturer has been told for years that he must cater more to the wishes of the foreign buyer if he hopes to get business. The student of export trade has said repeatedly that the American manufacturer has been allowing other countries to capture markets of the world because he insisted on turning out his products exactly the same for export business as for domestic consumption. The American attitude, we have been told right along, has been that if an article was good enough for America it was good enough for the rest of the world.

In many countries the automobile driver wants a right-hand drive. In most foreign countries he demands a speedometer with metric symbols and he wants wire wheels. He wants other little changes from standard American cars most of which seem trivial perhaps, but which to him are big. While we have not gone into the business of making special cars for export, Packard Motors Export Corporation, our export division, has been meeting these little requests and the factory has redesigned our cars to permit a right-hand drive, all of which has played a

big part in the heavy demand we are experiencing from all over the world.

To illustrate, the English people demand a right-hand drive. Wednesday we shipped six chassis to England. Duty on complete cars is so heavy in England as to make the price of American-built cars practically prohibitive. When chassis alone are purchased, giving English workmen employment in the building of bodies, the duty is such as to permit us to compete with the English manufacturers.

Argentina is recovering from a business slump, Macauley said, and a large number of cars have been shipped to that country recently. Japan, the Philippine Islands, New Zealand, China, San Salvador and Venezuela also have been good buyers despite civil war in China and a business depression in Venezuela.

Packard has been entering Bombay, India, one of the strongholds of European automobile manufacturers, and a number of cars have been shipped there recently. The Bombay representative recently wrote that prospects for considerably heavier business were good. Macauley and other factory executives said there seems to be a much better feeling over general business throughout the world, with prospects bright for America entering into a strong foreign buying movement very shortly.

Edison Able to Meet Daily Needs for Coal

(Continued from page 336)

it is pointed out that many of the industries classed as essential would be operating at a low figure or not operating at all.

Though there is talk of a session of automobile executives to form plans to dispute this ruling there has been no action and will be none unless conditions become acute. Regarding the coal administration ruling placing coal for domestic use second on the priority list it is felt that this is ill advised as there will be no need for coal for house heating for at least several months. In the meantime much coal for industrial purposes could be accumulated and the workers of the city would have money to buy coal when they needed it.

Increase Radiator Size Consul in Syria Advises

WASHINGTON, Aug. 15—The building of larger radiators, or the installation of certain appliances on cars sold in Syria has been recommended to the American exporter of automobiles to that country by Consul Frederick Q. Bird, located at Beirut, Syria.

European automobile manufacturers already have come to recognize the need of extra water supply systems in their cars and are now making shipments into that district to meet the requirements of the Syrian purchaser. To date only one American firm has made any effort to meet this local condition but its efforts have been rewarded with a considerable increase in the number of sales, the consul reports.

Tractor Shipments Exceeding Year Ago

Production, Association Review Says, Is Hampered by Scarcity of Labor

CHICAGO, Aug. 12—The monthly trade review issued by the National Association of Farm Equipment Manufacturers notes that up to July 15 tractors were moving fairly well and that the sale of general farm equipment, including gas engines, was at least equal in volume to the corresponding period of last year. Speaking of the business done by jobbers in the equipment lines, the review says:

Generally speaking, it is reported from 50 to 75 per cent of normal, although a few of the firms whose goods they handle are doing a normal business. During July and August a slowing up of trade is not unexpected, due to the seasonal character of the goods sold, but jobbers anticipate that the period will show an improvement over last year unless the railroad and coal situation complicate matters unduly.

Lighting Plants' Output Low

Sale of farm lighting plants is reported far ahead of last year, although still below normal. Production is said to be at a low point, shipments being made out of stock to a great extent. The eastern and central states are said to be showing the most interest in lighting plants.

Conditions in the gas engine industry are said to be improving, with the betterment more noticeable in the industrial field than in farm engine lines. A majority of manufacturers reported tractor and thresher shipments ahead of those for last year. Production, the report says, has been increasing since the first of the year and would be greater were it not for the difficulty of securing labor. Tractor sales are said to have been well scattered throughout the agricultural states.

Expansion Reflects Conditions

RACINE, WIS., Aug. 14—Due to the greater activity and improving prospects in both the automotive as well as the tractor and farm implement industries, the Belle City Malleable Iron Co. has undertaken a plant enlargement program involving an investment of \$750,000 spread over a period of about 18 months.

The present plant will gradually be replaced by more modern structures. The first work is to build and equip a large addition to the annealing department. This will be 260 ft. long and occupy the site of the office building. The building also will contain a new producer gas plant to serve the malleable furnaces.

A new administration building will also be erected at once. The present construction involves about \$400,000 and will be completed about Jan. 1, it is estimated.

Plants in Cleveland Gained During July

Industry Sets Pace in Volume of Business and Number of Men Employed

CLEVELAND, Aug. 15—Production in Cleveland automobile factories and accessory-making establishments increased slightly in July over June, according to the report of the labor relations committee of the Cleveland Chamber of Commerce.

The number of employees in 18 concerns reporting was 2.7 per cent greater on July 31 than on the last day of June.

The automobile industry continued during July to set the pace in volume of business for all others in Cleveland, according to this report, which shows that the industries of Cleveland as a whole had 4.6 per cent fewer employees at the end of July than they had at the close of the previous month.

The automobile concerns reported 10,996 employees, as compared to 10,710 on June 30.

The iron and steel industry of this city has been hardest hit of all the local groups. It showed a loss in employees in the monthly period of 11.6 per cent.

The building industry has been helped by the demand for residences and business places, employment increasing 4 per cent. Metals and metal products other than steel showed a gain in employees of 5.4 per cent.

Portuguese East Africa Offers Market for Cars

WASHINGTON, Aug. 15—A potential automobile market, especially for lighter makes of cars, is reported in Portuguese East Africa by the American consul at Lourenço Marques. The territory covers 426,712 square miles and only 172 motor cars are registered in the province. Of this number 150 are in the City of Lourenço Marques, a place having 18,355 inhabitants, of which 6500 are white.

Preference for American cars is indicated by the proportions sold there, although the field is practically a virgin one for the foreign automobile importer. Operating expenses are much greater than in the United States, gasoline being about 50 per cent higher.

POSTPONE BARTON AXLE SALE

MILWAUKEE, Aug. 15—The sale of the physical assets of the defunct Barton Axle Co. of Barton, Wis., has been postponed until Sept. 2, at 10 a. m. Attorneys for the receiver, Henry J. Dressel, and for the creditors' committee, F. G. Eppley, chairman, asked delay because a prospective purchaser has failed to comply with the terms of his bid and is no longer interested in the property. A minimum bid of \$80,000,

JULY OUTPUT PROVED 39 PER CENT BETTER THAN SAME MONTH LAST YEAR

NEW YORK, Aug. 14—With the figures 90 per cent complete, reports to the National Automobile Chamber of Commerce indicate that July production of passenger cars and trucks approximated 246,600 which exceeded July 1921 by 39 per cent and the best previous July which was in 1920 by 20 per cent. The decrease under June of 14 per cent is seasonal and expected. The following table shows the factory shipment figures for the first seven months of 1920, 1921 and 1922.

	Carloads			Driveaways			Boat		
	1920	1921	1922	1920	1921	1922	1920	1921	1922
January	20,057	6,485	15,357	29,283	3,185	7,479	....	93	143
February	25,505	9,986	19,636	43,719	7,507	10,173	....	99	180
March	29,236	16,287	27,753	57,273	9,939	16,917	....	75	560
April	17,147	20,187	31,334	64,634	14,197	22,381	....	1,619	2,960
May	21,977	18,608	33,416	74,286	15,193	23,827	....	2,381	7,406
June	22,516	20,269	34,230	60,746	18,834	33,857	8,350	3,947	7,737
July	23,082	19,514	28,412	52,342	15,533	28,022	8,702	3,726	6,855

Factory shipments for the other months of 1920 and 1921 follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
August	23,386	20,350	34,060	14,290	7,095	3,565
September	20,804	20,150	24,431	13,550	5,469	3,580
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134

with a cash payment of \$2,500 at the time of sale is prescribed by the circuit court.

July Made New Mark in Output Records

(Continued from page 336)

on to the public. There is entire absence of indication that there is to be an epidemic of price cutting, or anything approaching a price war. A contrary indication is found in the fact that Durant Motors has guaranteed prices to Aug. 1, 1923.

Reports from various parts of the country indicate that the public has shown a normal reaction to the price reduction announcements. Sales have been stimulated slightly on most of the lines reduced while there is a temporary stagnation in some of the competing lines due to a natural holding off attitude on the part of purchasers. However, there are indications that the public is already beginning to see the reductions in their true light of a passing on of production economies by manufacturers able to do so. The much larger increase on closed models than on open cars promises well for fall and winter business.

SHALER COMPLETES PLANT

WAUPUN, WIS., Aug. 14—The C. A. Shaler Co., manufacturer of vulcanizing apparatus, headlight lenses and other specialized lines of garage and repairmen's and owners' equipment, has completed its new plant, erected to replace the works destroyed by fire early in the year. Operations were reinstated as quickly as the various departments were finished and the plant is now running at its maximum capacity.

New York Registrations Show Decline During July

NEW YORK, Aug. 12—Registration figures as compiled by Sherlock & Arnold, publisher of the Automobile Sales Analysis, for the ten counties in and around New York City for July show a total of 8494 as compared with 9068 in June and 9431 in May. For the first seven months this year, registrations aggregated 48,073 as against 30,422 for the same period last year.

In the medium and low priced class four cars lead the field with three others some distance behind but considerably ahead of those following them. Nine cars are well in the lead in the higher priced cars.

A summary of registrations for the first seven months in the high, medium and low priced classes is as follows:

	Medium and Low Price	
	High Price	Low Price
January	283	2,017
February	273	2,231
March	632	6,354
April	862	8,428
May	961	8,470
June	865	8,203
July	678	7,816
Total	4,554	43,519
Total (1921)	2,879	27,543

OHIO TIRE CHANGES NAME

FORT CLINTON, OHIO, Aug. 14—Purchasers of the Ohio State Rubber Tire Co., which was sold recently at receiver's sale for \$150,000, have changed the name of the concern to the Wildman Tire & Rubber Co. The new company will be incorporated for \$250,000, of which \$200,000 will be common stock, no par, and \$50,000 preferred. Directors are named A. Twynham, Akron; H. B. Orr, Bay City; Mich.; F. J. Reichert, Port Clinton; W. A. Tynham, Akron; N. B. Orr, Bay City; F. J. Langenau, Cleveland.

Northwest Promises Billion Dollar Crop

Farmers Expect to Have Money for Automotive Equipment This Fall

MINNEAPOLIS, Aug. 14—Here's some crop news that will interest the automobile truck and tractor manufacturer. The Northwest farm products crop for 1922 is going to total more than \$1,000,000,000. This is the opinion of E. G. Quamme, president of the Federal Land Bank at St. Paul, who has returned from a trip through the territory. He says production costs will be less than in recent years, much less because the farmers have been carrying their operations on with economy.

"With fair prices, therefore, it should be a good money crop for the farmers of the Northwest; in fact, the best we have had in years," Mr. Quamme said.

Yields Above Average

With harvesting already underway the wheat output in Minnesota is safe. Yields are to be above the average for 50 years of 13½ bus. to the acre. The quality is to be higher than for many years. The rye has been harvested and it is a tremendous high quality crop. Potatoes and corn look well. Although the Minnesota crop is large and the Dakota crop promises to be equally good, in other areas yields have been cut down enough to make good prospects for the Minnesota and Dakota grains.

E. W. Dedker, president of the Northwestern National Bank, one of the influential banks in this part of the country, a conservative talker, said: "This is an agricultural country and good crops mean good prices. I have no doubt that this year's crop will boost Minneapolis business and hasten the return of prosperity."

Best Small Grain Crop

C. C. Webber of Deere & Webber Co., agricultural implements and automotive equipment, said: "It is a fact that this is the best small grain crop for many years and that other crops are uniformly good. This will go a long way toward putting the farmers on their feet, financially speaking. Collections will be easier this fall, and new business will be given added impetus next spring. Prosperity for everybody won't come in a day, but a good crop this year will be a long step toward it.

"North Dakota probably will produce the greatest and most valuable crop of any state this year. It is fair to assume that the agricultural products of that state alone will be worth approximately \$200,000,000, and that the value of all the farm products in this section will be more than a billion dollars."

M. O. Grangaard, secretary of the War Finance Corp., said: "If the crop materializes as it looks, it will have the effect of restoring more stable conditions than have prevailed in two years in the busi-

ness life of the territory. The liquidating ability of the farmer, of course, will depend on the price he receives for the crop. With reasonable prices, a good crop, such as is in prospect, is bound to stimulate buying in the country, and this naturally will be reflected in the cities. In my opinion a general stimulus will come out of the situation."

E. J. Fairfield, Lindsay Brothers Co., wholesale farm machinery and twine, said: "A feeling of security has come over business in the Northwest, where everything depends on agriculture. Without any question we now are on the high road to business recovery, and we will have arrived after the farmer threshes his crops. The crop is better than we had hoped for."

British Trailer Converts Truck Into Six-Wheeler

WASHINGTON, Aug. 15—The construction of a new type of trailer attachment by British automobile manufacturers has been reported to the automotive division of the Department of Commerce. The new attachment will convert an ordinary truck into a practical six-wheeler, this being accomplished by the use of a conversion attachment, fitted to the rear of the truck by a universal joint.

One of the features of the innovation is that the wheels of the trailer follow in the track of the truck wheels. The trailer wheels are controlled by a separate brake. The new arrangement is said to increase the capacity of a truck 100 per cent with but a small increase in the cost of operation.

New Bethlehem Contract Is on Perpetual Basis

NEW YORK, Aug. 14—The Bethlehem Motors Corp., manufacturer of the Bethlehem truck, has developed a contract with dealers which will be on a perpetual basis, automatically renewable year after year, so that Bethlehem dealer connections will be permanent connections of the new corporation.

The new contract provides for a stipulated number of deliveries during the first year—the number of trucks specified being on a conservative basis, in many instances only half the quantity the distributors and dealers estimate their territory will absorb. If the quota in the first year is taken, the contract continues for the second year, with an increase of 25 per cent in delivery specifications for the second year period, and a similar increase each year thereafter.

A sliding scale of discounts is used, the chassis and parts discounts depending on the size of the territory and the number of deliveries to be taken during the first year.

Under the new form of dealer relationship, there will be no renewing of contracts at stated intervals, but instead, changes that may be advisable from time to time will be made in the form of appendices to the contract proper.

Chicago Mayor Asks \$3,000,000 for Buses

City May Embark Upon Extensive Experiment in Municipal Operation

CHICAGO, Aug. 12—A week after the settlement of Chicago's street car strike which completely tied up street and elevated railway transportation for six days the city is continuing to operate a number of the buses it placed in service to help in relieving the emergency.

This is the chief tangible result of the strike, although the prompt and dependable service rendered by motor vehicles made an exceedingly favorable impression upon owners and non-owners alike and established an interest in automobiles and trucks and good will toward them which dealers are counting upon to make sales much easier for the next few months.

Strike Affects Business

A remarkable feature of the strike was the fact that there was no immediate increase in sales. Retail motor car business was somewhat duller during the week of the strike than in any week for some months. This indicated that the motor vehicles, approximately 200,000, in and around Chicago were sufficient for immediate transportation needs and further that unsettled business conditions accompanying a city-wide strike affected the automobile business as well as the general merchandising.

The city administration proposes to operate buses on an extensive scale and has asked the city council to appropriate \$3,000,000 to buy buses. This matter has been referred to the transportation committee of the city council and the chairman of the committee has announced that a careful study of the possibilities of bus transportation will be made within the next few weeks. The result of this study is likely to determine whether or not Chicago will embark upon an extensive experiment in municipal bus transportation.

Japan Puts on Market New Electric Side-Car

WASHINGTON, Aug. 15—A new type of electric side-car has been placed on the Japanese market, the American consul at Kobe, Japan, has notified the automotive division of the Department of Commerce. The car is being advertised as being of Japanese manufacture, although most of the parts are reported to be made in Germany, with the bodies built in Japan.

The motor is a one-half horse power electric engine of a reversible type and may be charged by the ordinary electric current through a transformer. The present type is being confined to one seater models, as this is reported to be adaptable to economical operating conditions and to the narrow roads.

Men of the Industry and What They Are Doing

Chapin Goes to Europe

Roy D. Chapin, president of the Hudson Motor Car Co., and Mrs. Chapin sailed on the Mauretania Tuesday for a two months' tour of England, France and Germany.

Tire Officials Sail

W. O. Rutherford, vice-president of the B. F. Goodrich Co., left for a six weeks' business and pleasure tour of France, Germany and England on the Mauretania Tuesday, accompanied by L. D. Brown, treasurer of the company. Rutherford is also first vice-president of the Motor and Accessory Manufacturers Association and chairman of its Foreign Trade Committee. They will study general trade conditions and the tire and rubber industry in Europe, their plans including a visit to the Goodrich plant at Colomb, near Paris, and the headquarters of the company in London.

Hoagg Advertising Manager

K. K. Hoagg has been appointed advertising manager of the Hyatt Roller Bearing Co., motor bearings division. Hoagg has spent nine years in engineering and sales work for the company. His new work will require supervision of the advertising, sales promotion and commercial research work for the division.

Butterfield Back with Owen

Clayton W. Butterfield has been appointed manager of the sales and service department of the new Owen Dyneto Electric Corp., Syracuse. Butterfield held a similar position for four years in the old Dyneto corporation. He left it in the spring of 1920 to accept the post of sales manager of the Herschell-Spillman Motor Co. at North Tonawanda. The past year Butterfield served as assistant general manager of the Apex Motor Corp. and resigned to return to Syracuse.

Remington Directs Advertising

Charles F. Remington, vice-president of the Fred M. Randall Co., Detroit, has been named director of advertising and publicity of the Detroit Air Cooled Car Co.

Randall Has New Connection

O. R. Randall, connected for some time in an executive capacity with the Hanson Motor Co. of Atlanta, has resigned to become general sales manager for a large soft drink bottling company in Atlanta.

Mead Rejoins Federal Rubber

George J. Mead, who resigned last year as chief plant layout engineer of the Federal Rubber Co., Cudahy, Wis., has been recalled to take charge of an extensive plant enlargement program which

the Federal company is putting under way and which will cover a period of several years. Mead for eight months had charge of experimental, development and production engineering for the Motor Player Corp., Chicago, manufacturing electric motors and reproducing devices for player-pianos. He now resumes a connection with the Federal company lasting more than eight years. Mead is a mechanical and civil engineer.

Burnett with Homer McKee

Leo N. Burnett has resigned as advertising manager of the LaFayette Motors Corp. of Indianapolis and will join the copy and planning department of the Homer McKee Co., Inc., advertising agents, Indianapolis, early in September. Burnett has directed LaFayette advertising since the inception of the company three years ago and was previously advertising manager of the Cadillac Motor Car Co. of Detroit.

Camm With Western Iron

John A. Camm, for twelve years director of sales of the Kearney & Trecker Corp., Milwaukee, a large manufacturer of milling machines and other machine tools, has resigned to become president of the Western Iron Stores Co., Milwaukee, which will develop its machine tool department under his direction.

Fox Promotes Hackethal

B. F. Hackethal has been appointed chief engineer for the Fox Motor Car Co. of Philadelphia. He was previously acting in the capacity of consulting engineer for the company.

Huntoon Changes Companies

Harry Huntoon, two years in the engineering department of Deere & Co., Moline, Ill., has been appointed plant engineer at the International Harvester Co.'s tractor plant in Chicago. He will be associated with R. R. Keith, former works manager for the Universal tractor.

Hendrick Leaves Fisk

George B. Hendrick has resigned as assistant sales manager of the Fisk Rubber Co. to become sales director of the W. L. Douglas Shoe Co., Brockton, Mass.

SERVICE ASSOCIATION GROWS

DETROIT, Aug. 16—The Automotive Electrical Service Association, composed of electrical service stations in various parts of the country, has built its membership from 62 to 250 during the past year, according to reports read at a meeting of the board of governors here.

The governors discussed plans for furthering the work of the association whose object is to make specialized electrical service work available both for dealers and owners.

New "Sales Executive" Published by A. E. A.

Folder Will Be Sent to Manufacturer and Jobber Members of Association

CHICAGO, Aug. 15—The Automotive Equipment Association has come with its third publication. *The Sales Executive*. The publication, a four-page folder, will be sent to sales executives of both manufacturer and jobber members, with the object of assisting them in their work of co-operating with the association's merchandising campaign. In the first issue it is announced that the publication will be continued "if it meets with the approval of the men who plan and direct sales for the members of the association."

Other publication efforts of the association are *The Leader*, general organ of the association, published under the direction of Commissioner William M. Webster, and *The Automobile Equipment Merchandiser*, which, like *The Sales Executive*, is edited by Ray W. Sherman, merchandising director. *The Merchandiser* goes to salesmen of association members, both in the manufacturer and jobber fields.

Passing on Ideas

In announcing the new publication, Sherman says that the merchandising department has been "handicapped because of our inability to get into the sales idea business the way we feel we should." He then speaks of ideas which have been sent in by sales executives, but for which previously there was no means of distribution, adding that "If the good idea of one good sales executive could be passed along and used by the sales executives of the 497 other sales executives in the A. E. A. it would be like firing 498 business-building shots at the trade instead of one." The new publication will try to accomplish this.

The first issue reproduces sales promotion advertisements of two manufacturers and one jobber and reports work done by various sales executives in various parts of the country in the merchandising campaign.

COMMITTEE FOR GILLETTE

MILWAUKEE, Aug. 14. — Official notice is being published to stockholders, creditors and bondholders of the Gillette Rubber Co., Eau Claire, Wis., that a joint meeting will be held at the general offices at the plant on Sept. 1, at 2 p. m. for the purpose of considering the matter of the appointment of a committee or committees for the protection of the interests of creditors or stockholders. The notice is signed by R. W. Hutchens, secretary.

Dealers Optimistic After Tire Meeting

Feel That Manufacturers Have
Sincere Desire to Help
Solve Problems

NEW YORK, Aug. 12—Out of the meeting of the committee of the National Tire Dealers Association and executives of the Rubber Association, held here this week, will grow a spirit of co-operation that will result in the ultimate solution of the mutual problems of both, according to a statement made by R. F. Valentine, president of the dealers' association.

Cordial Reception Given

"We feel gratified that the opportunity was given us to present directly to the manufacturers the aims and objects of the National Tire Dealers Association," said Valentine. "The reception accorded us and the consideration and discussion which was given the various merchandising problems were such as to indicate a sincere desire upon the part of the manufacturers to help dealers solve their problems."

Valentine would not give any details at this time of the progress that was made. Arrangements were made, however, for future meetings to which both organizations will send representatives to discuss problems that arise.

The tire dealers were represented at the conference by R. F. Valentine, R. J. Walters of Baltimore; George J. Berger, New York City, and Frank Zeman, Chicago. The manufacturers had at the meeting G. F. Shugart of the United States Tire Co.; John V. Mowe of Kelly-Springfield; E. H. Broadwell of Fisk; H. C. Miller of Goodrich; L. J. Plumb of Madison; W. W. Duncan of Hood; Phelps of Kenyon; DeLisser of Ajax; W. O'Neil of the General; Waddell of Goodyear, and Fairbanks of Firestone.

The price question was not discussed.

Questions Taken Up

The dealers made these requests:

That the national and commercial accounts be eliminated:

Compel car agencies to sell all changeovers at regular list prices or turn the tires into the nearest branch at cost:

Increase the price of tires to the car manufacturers to a basis that will insure a reasonable profit and take away incentive for resale at retail.

Discontinue publication of all lists other than consumers' price list:

Classify retail distributing agencies and proportion the discounts in the ratio of the value of each classification:

The retail hardware, drug, confectionery and grocery stores to be put in one class; the wholesale groceries, hardware and department stores to be put in another class and the legitimate tire dealer in a third class:

And hold purchasers of equipment to actual requirements and effect such an arrangement that will absolutely prohibit these same car manufacturers and their agencies from disposing of any stocks at less than regular prices.

The dealers' program provides for the elimination of every tire whose quality is not proved, or where there is any question of the policy and methods of the manufacturer; an appropriation of not less than 2 per cent of gross business for advertising purposes and absolute loyalty to the manufacturer whose goods are sold.

Westcott Is Expanding Production of New Car

SPRINGFIELD, OHIO, Aug. 15—Quantity production of the new seven passenger Westcott car was started at the plant of the Westcott Motor Car Co. Monday. The few cars that have been built so far have been sent to Cincinnati, Cleveland, Chicago and Oklahoma City.

Difficulty in securing materials was partially overcome during the past week with the result that shipments of Westcotts were better than at any time this month. Officers of the company say they expect a further increase in output during the remainder of August. Indications are that this will be the company's best year in point of sales, sales so far exceeding last year's by more than 50 per cent.

The Kelly-Springfield Motor Truck Co. is enjoying a ready sale of its new model. The plant is gradually speeding up and increasing its force.

The Steel Products Engineering Co. booked orders during the past week for ten sets of Liberty stub tooth gears for aeronautical engines. The plant is gradually getting back to its old time swing. The government order for balloon equipment is about one-fourth finished, and shipment will be made within the next three months. A number of skilled machinists was added to the force recently.

WILLYS-OVERLAND'S REPORT

TOLEDO, Aug. 15—Willys-Overland Co. and subsidiary companies for the five months ended May 31, 1922, report net loss of \$1,661,262 after charges and depreciation. The net sales aggregated \$28,281,981 and the operating profit \$847,714. The consolidated balance sheet for these companies, with the exception of the Wilson Foundry & Machine Co., shows inventories of \$15,263,759; accounts receivable, \$858,075, and cash, \$7,703,713. Among the liabilities are included notes payable of \$18,334,035 and accounts payable of \$3,860,685.

AIR REDUCTION EXPANDS

MILWAUKEE, Aug. 14—A new oxygen plant, representing an investment of \$135,000, is being established in Milwaukee by the Air Reduction Sales Co., Inc., New York, to serve Northwestern territory. This is part of the general enlargement program adopted by the company since it absorbed the Davis-Bournonville and National Carbide interests. In Milwaukee the company has purchased the plant of the Petit Manufacturing Co.

Republic Truck Gets New Working Capital

Details of Plan for Readjustment
of Capitalization Being
Worked Out

NEW YORK, Aug. 15—Following a conference between C. H. Poppenhusen, representing the bankers' committee, and M. N. Buckner, representing the note holders' committee, it is announced that ample working capital has been secured for the Republic Motor Truck Co., Alma, Mich., which will permit of the carrying on of the business. Details of the plan providing for a readjustment of the company's capitalization and indebtedness are now being worked out, but as yet Buckner has not made an announcement.

It is said that, although the truck company showed a deficit for the first five months of the year, a small profit was shown in June, and had it not been for the railroad strike July would have turned in a profit of \$75,000.

Government Given Rebate on Road Work Equipment

WASHINGTON, Aug. 15—The Bureau of Public Roads announces that a saving of several thousand dollars in rebates will be made by the government in the recent shipment of automobiles and trucks, allocated from the War Department to the Agricultural Department, and then transferred to the several states.

Because of the fact that the trucks and passenger cars were for use in the building of good roads, and all of them second hand, the Interstate Commerce Commission, at the behest of the Agricultural Department ruled that such automobiles and trucks shipped for use in road building, and which were second hand, could be shipped as "contractor's equipment" and as such would take a lower rate. The saving between the automobile rate and the contractor's equipment rate will average about \$280 per railroad car.

Goodyear Stockholders Await Answer to Suit

AKRON, O., Aug. 15—Stockholders of the Goodyear Tire & Rubber Co., who are backing Mrs. Laura L. T. Weiss of Cleveland in her four actions filed in the Akron common pleas courts attacking from many angles the entire \$85,000,000 refinancing and reorganization plan of the company as negotiated in May, 1921, now are marking time awaiting the preparation and filing of answers to the four petitions, by the Goodyear company and the many defendants involved.

Practically all of the defendants named are banking interests which were connected with the Goodyear program of refinancing.

Strikes Have Aided Truck Manufacture

Shippers Steadily Turn to Motor Transport—Parts Plants at Capacity

MILWAUKEE, Aug. 14—The rail-coal strike has had a silver lining in that it has stimulated production of motor trucks and other commercial vehicles. Shippers are steadily turning to motor transport, feeling that even if the rail strike is settled within a short time, it is not unlikely that it will re-occur, and they have now had so much experience with difficulties of railroad operation through the whims of labor that they intend to fortify themselves against the perplexities which a situation like that now existing creates.

More Men Employed

Passenger car factories in this territory are employing more men at the middle of August than at any time this year. They are adding skilled help as rapidly as it becomes available. This class of labor is very scarce, although there seems to be a plethora of semi-skilled men, many of whom will not work unless placed in skilled jobs at the pay of such class of positions, and decline to step into their proper semi-skilled class.

Parts manufacturers and makers of equipment, both for car builders and the automotive merchandising trade, are running at capacity and have unfilled orders which will require present capacity until the end of the year. There are a few exceptions, of course, but as a rule factories are not able to keep deliveries on a basis equivalent to contract specifications or current orders.

Tire factories are running at capacity as well and look for no decline in operating schedules.

Local Conditions Improve

The "shuffling of the cards" and the "new deal" in prices has undeniably been responsible for a very marked stimulation of consumer interest in passenger cars during the past week. As usual, a good many prospects who did not gratify their desires to buy a new car in April, May and June, were perfectly willing to wait until after Aug. 1, the beginning of the new season, to see what the manufacturers would bring out for 1923, and what the price would be.

Few people if any believed that new prices would be higher; in fact there was an undercurrent of gossip and even some well-authenticated reports that the new season would witness a further reduction. Consequently those who waited are now coming into the market and the sales curve is taking another upward swing.

Motor truck demand is increasing steadily. The call is largely for specialized equipment rather than the standard types. This embraces passenger carrying trucks, freight trucks with special

body designs; contractors' and highway construction cars, etc.

Retailers of automotive equipment are experiencing an active call for miscellaneous goods for old as well as new cars, despite the fact that more and more passenger car manufacturers are putting cars through with every foible of the customer satisfied.

British Conquer Egypt Through Dealer Policy

WASHINGTON, Aug. 15—Conquest of the automotive market in Egypt is being made by the British automobile manufacturer who has adopted a dual policy toward Egyptian automobile exporters in an effort to secure a larger share of their business.

Paramount of the two methods which are being adopted to sell more automobiles in that country is the policy of shipping to reputable dealers on consignment, in order to compete with other markets. The other medium is to allow their Egyptian importers the benefit of price reductions on cars in stock, when such reductions are made in Great Britain.

The automotive division of the Department of Commerce has been advised that as a result of these two changes in selling cars in Egypt that British automobile manufacturers are effecting a considerably larger sales volume.

Automotive transportation of all kinds in Egypt, particularly with regard to taxicabs and commercial vehicles, received a considerable impetus during 1921. There are over 1600 passenger cars, of which 234 are taxis, and 120 trucks in Alexandria, while in Cairo there are registered 2200 passenger cars.

European Cars Appeal to Japanese Importers

WASHINGTON, Aug. 15—European exports of automobiles to Japan are increasing, while United States exports are decreasing. This is attributed to the growing popularity in the Japanese market of European cars because of their low fuel consumption and low horsepower, the United States commercial attache reports to the automotive division of the Department of Commerce. June exports of American passenger cars to Japan dropped to 10 as compared with 176 in May and 116 in April. Truck exports dropped from 128 to 86.

MILLER HAS NEW CORDS

AKRON, Aug. 14—A new line of cord tires called the Wedge Tread, in sizes ranging from 30 x 3½ to 35 x 5 is announced by the Miller Rubber Co. The 30 x 3½ clincher lists at \$12.50, the 30 x 3½ straight side at \$13.50, the 32 x 3½ at \$19.25, 31 x 4, \$22.20; 32 x 4, \$24.50; 33 x 4, \$25.25; 34 x 4, \$25.90; 32 x 4½, \$31.45; 33 x 4½, \$32.15; 33 x 5, \$39.10; 35 x 5, \$41.05. The new Relim fabric sells at \$9 for the 30 x 3 and the 30 x 3½ at \$10.

Tariff Bill Loses Reciprocal Proviso

Question Will Be Brought Up Again When Measure Reaches Conferees

WASHINGTON, Aug. 16—Taking a final vote on the proposal, the Senate has eliminated the House provision in the tariff, providing a reciprocal duty on imports of automobiles, automobile bodies, automobile chassis and motorcycles when the duty is greater than 25 per cent, the rate carried in the bill.

The proviso which was struck out called for the imposition of a duty equal to the duty imposed by the country of export, not to exceed 50 per cent.

Senator McCumber, chairman of the committee on finance, who asked that the committee amendment striking out the House provision be agreed to, said that the request was based on the desire that all the matters of reciprocal tariffs go before the committee of conferees.

Gasoline Probe Halted, Giving Way to Tariff

WASHINGTON, Aug. 15—The Senate gasoline probe which has been under way for more than two months has been temporarily halted, pending the passage of the tariff bill. Members of the Committee on Manufacture, which is conducting the probe, state that the investigation will be resumed as soon as possible.

An offer to testify in the probe was received yesterday from W. C. Teagle, president of the Standard Oil Co. of New Jersey, by Senator McNary, acting chairman of the committee. Teagle's invitation will be accepted, according to Gilbert E. Roe, in charge of the probe, who states that the Standard's head leads the list of those who would be subpoenaed. The only witness heard to date is R. L. Welch, secretary of the Petroleum Institute.

"In the aggregate the automobile users of the United States have already profited by the investigation in lower prices, but it is the expectation that gasoline prices will not only be lower but will be more stable," Roe said.

RICO INJUNCTION DISSOLVED

PITTSFIELD, MASS., Aug. 15—Judge Burns of the Superior Court has dissolved a temporary injunction by which the Rico Ignition Co. was restrained from the manufacture of certain coils on the ground that an officer and employees of that concern were alleged to have made unfair use of information they had gained from the J. & B. Co., with which they were formerly connected. In issuing his decree Judge Burns said that "The respondents should not be put out of business pending final determination of this action on its merits."

New Job Announced by H. C. S. Motors

Shows Many Refinements in Engine, Chassis and Body—
Prices Increased

INDIANAPOLIS, Aug. 15—The new H. C. S., known as Series IV, is announced by the H. C. S. Motor Car Co. Mechanically the new job has many refinements in engine, chassis and body. In the engine more power has been secured by enlarging the bore from 3% to 3 3/4 inches.

The gear ratio has been lowered, pistons have been lightened and connecting rods improved, and to the ignition system has been added an automatic spark advance. The Brown-Lipe transmission and clutch have been adopted. The rear axle, too, is new, two double rows of annular ball bearings now being used in the rear of the main driving pinion instead of one and to avoid sticking brakes strong pull-back springs have been added.

Body changes are many. All the seats are wider and the backs higher, with deeper upholstery, with Marshall upholstery springs making for easy riding quality. The floor boards of the tonneau have been leveled for more leg room. There is a large rectangular plate glass window in the rear of the passenger compartment and an option of black enameled or dual toned hand buffed leather is given in the open models and of mohair or broadcloth in the closed ones.

The new list prices show an increase of \$75 on the open models and \$325 and \$400 on the closed ones. New prices are as follows:

	Old Price	New Price
2-pass. roadster.....	\$2,400	\$2,475
4-pass. phaeton.....	2,400	2,475
Sport sedan.....	2,850	3,250
Standard sedan.....	3,150	3,475

Columbia De Luxe Series Replaced with Elite Line

DETROIT, Aug. 16—The Columbia Motors Co. has replaced the de luxe series of six-cylinder cars with the Elite line. The principal mechanical change consists of the substitution of the Continental 8R engine for the 7R engine used formerly. Five body models are included in the series—five passenger phaeton, two passenger roadster four passenger sport, four passenger coupe and five passenger sedan.

AMAZON MAKES CUTS

AKRON, Aug. 14—Price reductions are announced by the Amazon Rubber Co., the cuts being on the heavy duty non-skid cords and the air bag cushioned non-skid fabrics. The excise tax is included in the new prices. Reductions on some of the popular sizes in cords are as follows: 30 x 3 1/2, from \$18 to \$15.95; 33 x 4 1/2, from \$33.40 to \$30.05; 34 x

4 1/2, from \$45.20 to \$39.50. Fabrics: 30 x 3 1/2, from \$13.95 to \$10.50; 31 x 4, from \$21.75 to \$20.65. In the larger sizes in the fabric line the old prices are retained.

DISCUSS TIRE PRICE CUTS

CHICAGO, Aug. 12—The monthly meetings of the Midwest Rubber Manufacturers Association were resumed here this week when representatives of 35 firms met at the Morrison Hotel. The meeting was presided over by W. W. Wuchter of Omaha, president of the association. Recent price reductions by the large tire makers were discussed informally. Production by the firms represented is satisfactory.

Higher Prices Follow Changes in Mitchell

RACINE, WIS., Aug. 14—Following the addition of two new body styles and a decision to increase prices because of refinements and general improvements on all models, the Mitchell Motor Car Co. has issued the following list of new prices:

	Old Price	New Price
3-pass. roadster.....	\$1,490	\$1,750
4-pass. sport.....	1,690	1,850
5-pass phaeton.....	1,490	1,750
7-pass. phaeton.....	1,690	1,850
4-pass. coupe.....	2,050	2,325
5-pass. sedan.....	2,275	2,525
5-pass. phaeton (complete).....	—	1,790
5-pass. phaeton (standard).....	—	1,590

NOMA MAKES INCREASES

NEW YORK, Aug. 14—Noma Motors of New York announces an increase in prices, ranging from \$300 to \$500, affecting the whole line of C models. The prices are as follows:

	Old Price	New Price
2-pass. speedster.....	\$2,000	\$2,500
Foursome.....	2,100	2,500
6-pass. phaeton.....	2,200	2,600
5-pass. sedan.....	3,200	3,500

AUBURN LISTS DOWN

AUBURN, IND., Aug. 14—Reductions ranging from \$50 to \$200 are announced by the Auburn Automobile Co. The new list is as follows:

	Old Price	New Price
2-pass. roadster.....	\$1,575	\$1,575
5-pass. phaeton.....	1,575	1,475
4-pass. sport.....	—	1,895
4-pass sport (except equipment)...	2,195	1,995
7-pass. phaeton.....	1,615	1,545
Coupe.....	2,275	2,275
Sedan.....	2,395	2,345

NEW LINCOLN PRICES

DETROIT, Aug. 17—The Ford Motor Co. has reverted to a 136-in. wheelbase for all models of the Lincoln car. The coupe was the only model having a 130-in. wheelbase. Prices have been decreased \$200 on the sedan and increased \$500 on the coupe. The new list is as follows:

	Old Price	New Price
Sedan.....	\$4,900	\$4,700
Coupe.....	3,900	4,400

Says Lease Used Old Parts in Its Trucks

Condition Said to Have Been
Hidden—Trade Commission
Issues Complaint

WASHINGTON, Aug. 17—Charging that in the assembling of automobile trucks it used worn or second-hand parts and sold the completed product as new trucks without disclosing the true origin and facts concerning the building of the trucks, the Federal Trade Commission has issued a complaint against the Lease Motor Co., Inc. The complaint also is directed against its subsidiary the Acoma Motors Co., Inc. Both companies are located in Long Island City.

The Lease company is engaged in the business of repairing motor cars and trucks and in the rebuilding and selling of automobile trucks. The Acoma concern is principally a sales agent for the Lease company in the distribution of the latter's trucks. In the advertisement and sale of these trucks, the complaint alleges, the public was misled and deceived and it is charged that the practice was an unfair method of competition as against concerns competing with them.

The respondents are given 30 days in which to answer after which the case will be tried on its merits.

Charges Denied

NEW YORK, Aug. 17—"The Lease company will put in a defense on Sept. 28," says Robert Lease, president of the Lease Motor Co. against which the Federal Trade Commission has issued a complaint, charging the use of worn or second-hand parts in the assembling of trucks which later were sold as new. "We deny the charges. I feel that they originated with a couple of export houses with which we have had some friction. We build trucks and we never have used worn or second-hand parts in their construction, as charged.

"The Lease company has been in bankruptcy since April 1, with Eli Newman as the receiver. It is about to be sold to a new concern, the Panther Motor Truck Co., which will manufacture trucks in the Long Island plant. The matter has been brought to the attention of the court which yesterday signed the order permitting the sale."

ROAD FILM READY

WASHINGTON, Aug. 15—A series of one-reel motion picture films illustrating modern practice in the construction of the various types of highways, as being best adaptable to automotive use, has been prepared under the direction of the Bureau of Public Roads and are now available for free distribution upon application to the United States Department of Commerce.

The films are issued for the purpose of fomenting greater interest in building good roads.

Stock Sale Brings Government Charges

Officials Connected with Dragon Motors and Caterpillar Company Indicted

CHICAGO, Aug. 15 — Indictments against officials of two firms for alleged frauds within the automotive industry have been voted by a United States grand jury here and made public by Assistant United States District Attorney Harry F. Hamlin. The firms are:

Dragon Motors, capitalized at \$1,000,000; officers indicted, Herman Neidick, Joseph Stein and Hyman Edelman.

Caterpillar Manufacturing Co., Ltd.; officers indicted, Charles Weidman, W. C. C. Weidman, John A. Seibert, E. J. Anderson and M. E. Poehly.

In both cases misuse of the mails in the sale of stock or "territorial rights" is charged. It is charged that stock of the Dragon Motors was sold through the mails by the Neidick Financial Corp. on alleged fraudulent claims that the company was manufacturing one automobile a day, that it possessed assets of \$592,772 and that orders were on file for \$600,000 worth of taxicabs. It is charged that about 300 persons lost sums ranging from \$100 to \$5,000 through investment in the Dragon Motors.

The Caterpillar Manufacturing Co. is charged with having sold through the mails territorial rights for a "marvelous tire rejuvenation invention." It is alleged that territorial rights were sold at from \$100 to \$1,000 and that investors were told they could restore old casings and sell them for a guaranteed service of 5000 miles at \$5 each.

Want Uniform Motor Law for California

SAN FRANCISCO, CAL., Aug. 15—A uniform motor vehicle law, providing for the operation of capacity loads on trucks, general promotion of motor truck and motor stage traffic, and the safeguarding and preservation of the highways, will be sought through an initiative measure on the ballot at the November general election by the California Motor Transport Association, of which Fred Mott, of Fresno, is secretary.

Mott has just completed a tour of the state collecting data. Following the presentation of the results of his survey to the organization, the California Motor Transport Association adopted a platform which is to form the basis, either of an entirely new law, or of amendments to the present Motor Vehicle Act.

The platform is summarized by Mott as follows:

1. A uniform state vehicle law controlling weight, tire and other operating conditions, as well as uniform tax and the classification of existing highways throughout the state.

2. Extension of police powers to enforce such a law to the California State Highway

Commission and to all those charged with the maintenance of roads.

3. That the weight limit of truck and load for four-wheeled vehicles be 24,000 pounds; for six-wheeled vehicles with three axles, 32,000 pounds; and for truck, four-wheeled trailer and loads, total gross weight of 42,000 pounds.

4. That the license, or tax, on motor trucks be increased not to exceed 100 per cent of the present amount, in lieu of any other motor vehicle tax, and that those operating as common carriers and enjoying a special privilege, should pay an increased tax of not to exceed 100 per cent over and above this amount, together with an increased tax on passenger motor vehicles of not to exceed 100 per cent.

5. That measures for public safety, such as proper lighting, signaling devices and connections for trailers be incorporated in this law.

6. That the penalty include a clause making a jail sentence obligatory, in the case of a habitual offender.

Ford's July Production Surpassed June Record

DETROIT, Aug. 14—Ford production figures show that July production approximated 152,000, which surpasses June, when a Ford record was hung up in retail sales of cars, trucks and tractors. Sales for June totaled 148,439 vehicles, an average of 5709 daily. Of this total 132,950 were sold in the United States, 6054 in Canada and 9435 in Europe.

Another record is shown in the report of total sales for the first six months of 1922, a total of 652,261 being reached. In this period truck sales were approximately 85 per cent better than in the 1921 period. At the Rouge plant 436 Fordsons were completed on July 22, a high water mark.

Hydro-United Tire Co. Placed in Receivership

PHILADELPHIA, Aug. 14—Receivers for the Hydro-United Tire Co., of Pottstown, Pa., have been appointed by the United States District Court of the Eastern District of Pennsylvania, which has named John P. Hall and Ephraim Lederer.

The receivership was sought for, it is said, for the purpose of conserving the assets of the corporation and working out its affairs for the best interests of all the parties concerned.

Officers of the Hydro-United Tire Co. are: President, Charles A. O'Neill; vice-president, J. H. Phillips; treasurer, W. H. Reagan, and sales manager, A. V. Tisdale.

ARGENTINA ROAD PROGRAM

WASHINGTON, Aug. 15—Active steps for the construction of a national highway transport system in Argentina are reported to have been taken with the appointment by the First National Good Roads Congress of a permanent committee to obtain legal sanction of the projects of the Argentina Congress. Among these projects is the construction of 106,875 miles of good roads.

Louisiana Is First In Roads Under Way

Program Outlined by State Is Reported to Be 89 Per Cent Complete

WASHINGTON, Aug. 17—Progress report on the Federal aid highway construction program shows that on July 31, last, 14,348 miles of highways had been completed and paid for; 3951 miles completed and not yet paid for, and that 14,912 miles are under construction. Of the last named figure 56 per cent of the projects are completed. Reports made to the United States Bureau of Roads show that the states completed 600 additional miles of good roads during the month of July. Including projects not yet under construction, but which have been authorized under Federal aid, approximately 40,000 miles of road building comprise the Federal-states program for the fiscal year ending July, 1925.

Maryland at Bottom

The State of Louisiana ranks first in the progress being made on good roads under construction, her program having been 89 per cent completed. Her program contemplates the construction of 254 miles of good roads during the fiscal year ending July 31, 1923. Maryland, the figures show, is at the bottom, with a program of 29.7 miles, of which but 15 per cent is completed.

The largest amount of construction on roads is being done in Texas, where 1484 miles are under construction. Iowa comes next with 1043 miles, and Nebraska is a close third with 985 miles. In the State of Rhode Island but 6.6 miles are under construction for the year, of which 55 per cent have been completed.

American Tires Lead in Siamese Markets

WASHINGTON, Aug. 15—Between 1,500 and 1,600 passenger automobiles are in operation in Siam, according to a report received by the Department of Commerce from Consul J. P. Davis, Bangkok. About 75 per cent of these passenger cars are on metric clincher tires, about 20 per cent on inch clinchers and 5 per cent on inch straight-side tires. Straight-side tires are offered for sale in the Siamese market by the French Michelin company, as well as by American companies. American clincher tires are also freely available. American-made cars are still being brought into the Siamese market on metric clincher tires.

The total number of motor trucks in Siam does not exceed 150. About 10 per cent of the trucks use pneumatic tire equipment, the remaining 90 per cent requiring solid tires. The most popular tires in the Siamese market by nationality are American, British, French and Italian.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

Loans on call during the week covered a range of 3½ per cent to 5 per cent, as compared with 3 per cent to 5 per cent in the previous week. In time money a firmer tone was evident, due, doubtless, to the drawing down of balances by interior banks. The quotations were 4 per cent to 4¼ per cent for 60 and 90 days' and 4 and 5 months' maturities, and 4¼ per cent to 4½ per cent for 6 months', as compared with 3¾ to 4 per cent for the shorter maturities and 4¼ per cent for 6 months' in the previous week. The prime commercial rate continued at 4 per cent.

Unfilled orders on the books of the United States Steel Corp. at the end of July totaled 5,776,161 tons, the largest total of any month since the close of April, 1921. This amount compares with 5,635,531 tons at the end of June and with 4,830,324 tons at the end of July last year, and is equivalent to 5½ months' production at 75 per cent of rated capacity (approximately the rate at which the corporation has been shipping in the past few months). Despite restricted acceptance of new orders, the increase in unfilled tonnage during July was 140,600 tons, equal to 11 per cent of the monthly capacity.

According to returns from 30 companies which produce about 87 per cent of the country's output, steel ingot production in the United States during July totaled 2,487,104 tons, or a decrease of 5 per cent from the total for June. This compares with 2,634,477 tons in June, and 803,376 tons in July, 1921, which was the low point following the decline which started in the middle of 1920. The 5 per cent decrease in July's production was due principally to the coal and railroad strikes, as many furnaces were forced to bank and the transportation of coal was hindered.

The Government's Aug. 1 condition reports promise unusually good crop yields. The forecast of the corn crop indicates 3,000,000,000 bushels for the fourth time in history, and the total indicated grain yield is greater than the average of the record production of the war years. Other crops, including potatoes and tobacco, are particularly good, and the crop yields bid fair to be a powerful factor in the continuance of the upward trend of general business conditions.

DOUD BUYS PRECISION

PHILADELPHIA, Aug. 15—The Precision & Thread Grinder Manufacturing Co. has been acquired by A. T. Doud of Philadelphia. Doud, who is president and treasurer, was formerly mechanical engineer for Hale & Kilburn Co. of Philadelphia, general superintendent of the Speakman Co., Wilmington, and works manager of the Diehl Manufacturing Co., Elizabeth, N. J. During the war he served as general manager of

the Hero Manufacturing Co., Philadelphia, producing gas masks, and later became manager of manufacturing for the American Tube & Stamping Co., Bridgeport Conn.

F. V. Doud is secretary. C. A. White is a director. F. Rodger Imhoff, formerly sales manager, will be associated with the new organization as consulting engineer. The company will be reorganized in all departments.

China Has Large Stocks of Automobiles on Hand

WASHINGTON, Aug. 15—There is no market for automobiles in China at the present time. Local dealers are reported as having large stocks on hand with no purchasers. The average Chinese automobile dealer usually handles two or three makes of cars, the commercial attache in Shanghai reports, and American exporters are advised that the outlook for import automobile business to that country during the next six months is anything but promising.

"The one redeeming feature of the automobile business in China," says the report, "is the fact that good road movements are gaining in popularity and are spreading throughout the entire empire. With good roads the automobile business will stage a 'come back,' but at the present time, and possibly for six months to come, the outlook is not bright."

Best of All Years Enjoyed in Belgium

WASHINGTON, Aug. 15—The general use of automotive equipment in Belgium during the past twelve months is the greatest in the history of the automobile industry in that country. No figures are available as to the increase throughout the entire country, but registrations in the Province of Antwerp furnish some tangible idea of the growing popularity of the automobile, truck and motorcycle.

The recent registration of motor vehicles, passenger cars and trucks in Antwerp is 4800, representing an increase of 60 per cent over that of last year, while the use of motorcycles has increased 250 per cent during the past year.

A report on the conditions of the automobile industry in that country has just been sent to the automotive division of the Department of Commerce. There is an active demand for all kinds of automobile accessories, the report states. It is suggested, however, that American manufacturers can profit best by giving agencies to independent accessory dealers and not to garage owners or distributors.

This is explained by the fact that distributors and garagemen do not, as a rule, sell to any but their old customers and make no effort to cover the assigned territory or secure business outside of the usual run of automobilists whom they serve.

FINANCIAL NOTES

Marlin-Rockwell Corp. and subsidiary companies for the six months ended June 30, 1922, report a loss of \$34,479 carried to the surplus account. Net sales, inclusive of intercompany sales, amounted to \$2,223,011, from which \$1,339,193 was deducted for manufacturing cost. The balance sheet shows current assets amounting to \$3,567,674, of which \$408,966 is cash in bank and on hand; \$159,254 in notes and trade acceptances receivable and \$582,255 in accounts receivable. Current liabilities are reported at \$2,486,606, of which \$1,511,606 represents notes and accounts payable and \$975,000 a syndicate loan maturing July 7, 1923.

H. H. Franklin Manufacturing Co. stockholders now number more than 6,000 according to F. A. Barton, secretary and treasurer. This represents an increase of 20 per cent since the first of the year. The \$5,000,000 offering in capital stock now being subscribed will be devoted to financing of the new Franklin four. Barton states that total monetary subscriptions for common and preferred are almost equal in amount. For the first time in Franklin history, common stock which has always been closely held, is being offered to the public. The company is, increasing its plant force at the rate of 150 men a week.

Gray & Davis, Inc., \$1,000,000 first mortgage 7 per cent convertible sinking fund gold bonds offered at 100 and interest, have been heavily oversubscribed. The company for the six months ended June 30, 1922 showed net earnings before depreciation, Federal taxes and interest charges of \$208,562. This was at the annual rate of five and three quarter times the annual interest requirements of \$70,000 on the \$1,000,000 first mortgage 7 per cent bonds.

India Tire & Rubber Co. reports that the net volume of business for the last seven months totaled \$1,088,000, an increase of 46½ per cent in dollars and 80 per cent in units over the figures for the same period last year. Net earnings amounted to \$214,419.37, or 30 per cent on the total outstanding preferred and common stock for that period of six months. At the present time the company is turning out 600 casings and 800 tubes daily.

J. I. Case Threshing Machine Co. is reported back on a money making basis following a deficit of \$1,493,431 for last year. This deficit was due to a drop in its gross sales from \$34,547,000 in 1920 to \$17,255,000 in 1921 and the lowered value of inventories. The company was able to come through 1921 without public financing and at the close of May of this year its total debt of \$7,280,000 was more than \$4,000,000 less than May, a year ago.

White Motor Co. has declared the regular quarterly dividend of \$1 a share payable Sept. 30 to stockholders of record Sept. 20.

SALES IN SPAIN ARE GOOD

WASHINGTON, Aug. 15—Automobile sales in Spain during the month of June are reported as being exceptionally good, according to advices received by the automotive division of the Department of Commerce. June imports from the United States indicate the increased sales. During that month 239 passenger cars and 62 trucks were imported, compared with 141 passenger cars and three trucks during the previous month.

British Endeavoring to Recover Position

Chief Automobile Executives Confer in Connection with Foreign Markets

WASHINGTON, Aug. 18 — British manufacturers of automobiles are reported as having taken up in a "serious" way the possibilities of recovering some of their foreign trade, the automotive division of the Department of Commerce has been cabled by Trade Commissioner William H. Park at London. Conferences between the executive heads of the principal automobile manufacturers have recently been held for the purpose of considering ways and means of securing a larger share of the world's automobile export trade, of which the lion's share is coming to the United States.

In a report on the situation there, the Trade Commissioner says:

To Effect Economies

"British motor manufacturers are now giving serious thought to the possibilities of recovering some of their lost foreign trade. Although it is recognized that the high costs of production, with consequent high selling prices, along with the vagaries of exchange, will prove a great drawback, the manufacturers are determined to effect economies in some way.

Ways and means of competing in the world's mart of foreign automobile business are being considered at meetings of the various automobile heads. Their first concern, if they compete successfully with American manufacturers, is increased production and decreased cost per unit. Much depends upon the attitude of labor—whether or not labor will assist by accepting reductions in wages, adjustment of war bonus, and what is called a more reasonable attitude on the part of trade union leaders toward the manufacturers. It is necessary that labor co-operate in order that manufacturers here in England may make some definite plans for the future.

Output Has Improved.

"While the output of cars, motorcycles and cycles are improved during the past month, much remains to be done before the large works can restart their large complement and conditions once more become normal. Signs of activities are becoming more apparent in most departments of the automobile trade.

"Business in the heavier models is still slack, but the demand for light cars, of the more popular models, is satisfactory. The output of these cars will be considerable as soon as complete balance is restored in the shops."

OLIVER RIM RECEIVER

ATLANTA, Aug. 15—Following the recent filing of a voluntary petition the Oliver Rim Co., manufacturers of automobile rims, has been declared in bank-

ruptcy by the Federal courts here, and W. A. Fuller, of Atlanta, has been named receiver. An involuntary petition against the company has been denied.

INDUSTRIAL NOTES

H. & M. Body Corp., of Racine, Wis., owned jointly by the Mitchell and Hupp motor car companies, has started work on the construction of a new battery of dry kilns costing about \$130,000 to provide a more adequate supply of lumber and other wood stock for the body shops. The plant is overcrowded with orders for open as well as closed bodies, the volume of which is such that maximum operations until Dec. 31 are assured.

Sharon Pressed Steel Co. has elected the following new directors: L. B. LeBel, Edward O. Peck, Harold G. Mosier and A. E. Swan, to fill vacancies created by the retirement of W. L. Ulmer, W. H. Watkins, L. L. Knox and W. J. Parker. The officers of the company are H. W. Torney, president, A. E. Swan, vice-president, T. A. Pierce, treasurer, Harold G. Mosier, secretary and D. L. Santee, assistant secretary.

Globe Steel Tubes Co. has been incorporated in Delaware, following a change in control of the major interest in the Globe Seamless Steel Tubes Co. of Milwaukee, with a capital stock consisting of 5000 shares of preferred at \$100 each, and 100,000 shares of common without par value. The company is a large producer of seamless tubing for automotive purposes, high pressure boilers, and similar uses.

Haskelite Manufacturing Co., Chicago, has appointed James J. Dunne, formerly with the Crowell Publishing Co., as its representative in the territory east of Buffalo and Pittsburgh from the Canadian line to Virginia. His headquarters will be in New York City. The Hein-Nolan Lumber Co., Brooklyn, and P. Michel & Co., New York City, will continue as the eastern distributors.

Stover Signal Engineering Co., which recently moved its plant and offices from Cleveland to Racine, Wis., is now in quantity production of a line of three models of automatic signals for motor vehicles designed according to the latest ideas having reference to standardization of types and colors.

S. C. Johnson & Sons Co., Racine, Wis., manufacturer of wax finishes, varnishes, paints, etc., for motor cars, etc., let contracts during the week for a 3-story fireproof addition to its plant.

Lancaster Tire & Rubber Co., Columbus, reports that sales to date show an increase of approximately 100 per cent over the same period a year ago. The factories are operating double shifts.

Sam W. Hay's Sons, Pittsburgh, has been appointed representative of the Diamant Tool & Manufacturing Co., Inc. of Newark for nine counties in Pennsylvania.

IN NEW QUARTERS BY MARCH

FORT WAYNE, IND., Aug. 15—Work on the erection of the big truck plant of the International Harvester Co. here is going forward so fast that it is now stated as probable that trucks will be turned out of this plant by the first of next March. Building operations have been started by the Greater Fort Wayne Development Co. in constructing homes in the vicinity for plant employees.

METAL MARKETS

Pressure upon steel producers, especially so upon sheet mills, for shipments on account of tonnages contracted for earlier in the season continues to be exerted by automotive consumers who, however, appear to be holding fresh buying in abeyance pending a clearer view of the outlook. There is considerable jockeying for position between buyers and sellers, the automotive demand being once more the pivotal point in the steel situation. Professions of reluctance on the part of sheet makers to assume further obligations because of the uncertainty of operations are accompanied by expressions of regret at the manifest tendency of automotive purchasing agents to withhold additional business for the time being.

It is significant that the steel industry once more looks to the automotive consumers of its products to furnish the bridge for a safe crossing from the present uncertainty to the generally hoped for return of prosperity. Operations of those mill units that produce automotive requirements are not permitted to suffer more than it is utterly impossible to avoid under prevailing conditions. Advices from Youngstown early this week indicate that, although a decrease in operations had been expected, the week would witness an increase in the operations of independents, especially so in the bar output. It is only natural amid an absence of representative fresh buying the small tonnages that have been bought in the last few weeks to "fill in"—all material urgently needed by consumers—were booked at "full" prices.

With these small transactions as a basis the market for some products shows modest advances, ranging from \$2 to \$3 a ton over those that prevailed on August 1. This is especially true of cold-drawn steel bars for which makers now ask 2.25c. base Pittsburgh, as compared with 2.10c. earlier in the month. Cold-rolled strip producers also quote higher prices for early shipments. On contracts that permit of material being turned out in orderly sequence, thus adding to the backlog rather than upsetting the program of operations, unchanged price levels would apply. Sheet prices have undergone no change. Isolated instances of premiums for rush shipments of limited tonnages come to light here and there, but most of the small lots of sheets that were sold at premiums came out of warehouse and jobbers' stocks. Sheet bars appear to be in sufficient supply to permit of a continuance of operations of sheet mills at present rate, and the price level of \$35 remains unaltered. Producers of full-finished automobile sheets appear to have a sufficient quota of orders on their books to keep their mills in operation for the remainder of the current quarter.

Pig Iron.—A minimum of business is being transacted at the irregular prices now in vogue. Imported iron and more and more scrap are being resorted to as makeshifts pending more settled conditions.

Aluminum.—With the end of the tariff debate in the Senate apparently in sight and the provision for executive control of rates seemingly destined to become part of the new customs law, aluminum interests are more on the alert as to the effect of these conditions on the market. There is very little likelihood of eleventh hour shipments from abroad as European producers are not in a position to furnish much in the way of sheets beyond what they now have on their books.

Copper.—Some producers are asking a fraction over 14c., but this level continues to be the general market price for electrolytic.

Calendar

SHOWS

- Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.
- Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.
- Sept. 23-30—New York, Closed Car Show, Grand Central Palace.
- Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.
- Nov. 13-18—Chicago, Annual Show and Meeting of the Automotive Equipment Association.
- Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.
- Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.
- Jan. 8-13—Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.
- Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.
- Jan. 27-Feb. 3—Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.
- FOREIGN SHOWS
- Sept. 1922—Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobillista Brasileira.
- Sept. 15-20—The Hague, Automobile Show.
- September—Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.
- Oct. 4-15—Paris, Automobile Show, Grand Palais.
- Nov. 3-11—London (Olympia), Automobile Show.
- Nov. 10-Dec. 19—Brussels, Automobile Show, Palais de la Cinquantenaire.
- Nov. 29-Dec. 4—London (Olympia), Cycle and Motor-cycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.
- November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

- August 28-Sept. 2—Detroit National Safety Congress.
- Sept. 18-23, 1922—Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.
- Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.
- Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Aggressive Policies Required in Hungary

Foreign Manufacturers at Present Are in Control of Market There

WASHINGTON, Aug. 15—There is a total of 3640 passenger cars and trucks registered in Hungary, the automotive division of the Department of Commerce has been informed by the Department's commercial attaché. Of the total number but 2562 are in actual use, and of those in use 2159 are registered in Budapest. In the order named the Italian Fiat, Austrian Daimler, and German Mercedes and Benz are the preferred makes of cars.

American designs and makes of automobiles are well appreciated by Hungarian motor dealers who predict that if the market was vigorously worked that American cars could be sold in that country despite the fact that the market at the present time is controlled largely by the Italian, Austrian and German manufacturers.

However, nothing can be expected in the way of sales until direct representation is arranged for in Budapest, it is stated. An increased interest is being shown in automotive transportation, but the local automobile industry is in its infancy and has made no attempt to compete with foreign motor vehicles in supplying the market demand; the consul reports.

Trucks Carry Mails in Northwest Crisis

MINNEAPOLIS, Aug. 15—Removal of scores of trains by the railroads of the northwest, because of the strike and coal situation arising therefrom, is going to mean the use of motor trucks in the tenth division of the Railway Mail Service for carrying mail. Truck routes are

being laid out for use when needed. This includes Minnesota, the Dakotas, Wisconsin and Northern Michigan. Superintendent E. F. McBride already has put mail trucks in operation in Northern Minnesota and parts of the Dakotas, where railroad service has been reduced to an every other day basis. The trucks carry the mails on the off days.

In case the emergency arises motor truck routes will be operated from post-offices on trunk lines. While branch railroad service may be reduced at any time, the department is not expecting an immediate tie-up on main lines. Government-owned trucks are to be utilized where possible. Electric lines and motor buses will be utilized also. Contracts already are printed for postmasters to employ motor trucks where there are no vehicles belonging to the government.

Bus lines are profiting by the reduction in train service to Lake Minnetonka and suburban points. The Boulevard Transportation Co. to Lake Minnetonka and beyond has added 12 buses. Hourly service is given to some points, which is better than train service on a regular summer schedule. The Jefferson Highway Transportation Co. has put on two more buses to St. Cloud, 100 miles. Two buses have been put on between this city and Willmar, Minn., to replace Great Northern train service removed.

Philadelphia Reports Sales of Cars Active

PHILADELPHIA, Aug. 12—Sales of passenger cars have been reasonably active during the week just passed and truck sales show signs of improving. Automotive equipment, except in the smaller units, is spotty and slow. Probably the acceleration in truck sales is due, at least in part, to the wide publicity given to the use of trucks during the recent coal strike, and the railway difficulties.

Bodymaking, especially for trucks, shows some signs of improvement. Sales of tires are slow.

Swedish Dealers Sell Almost Entire Stocks

Now Await Deliveries of New Shipments—Prices 50 Per Cent Lower

WASHINGTON, Aug. 14—Increased activities in the Swedish automotive market have been reported to the Department of Commerce. Dealers have sold out nearly their entire stocks and are now awaiting deliveries of new shipments.

Market prices are reported to be approximately 50 per cent lower than they were last year. This is accounted for largely by the favorable exchange rate and the fact that a great many American cars have reduced their foreign prices.

According to Swedish import figures approximately 1000 American cars have been sold in Sweden during the past six months, compared with less than 100 cars imported from Germany. During the month of June a total of 1014 passenger cars and motor trucks and 204 motor cycles were imported.

U. S. Exports Increase

Exports of motor vehicles from the United States have increased steadily since the beginning of the current year, starting with 43 passenger cars and one truck in January and increasing to 802 passenger cars and 303 trucks in May. From January to May a total of 1420 American cars were imported into Sweden, compared to 639 the same period in 1921.

The unit value per car decreased from \$1,182 in 1921 to \$562 in 1922. Trucks exported from the United States to Sweden increased from 52 with a unit value of \$1,920 during January-May, 1921, to 361 with a unit value of \$927 during the same period in 1922, while Swedish imports of motor vehicles were smaller.